MDG Integration for Visual Studio 2005

Welcome to the MDG Integration for Visual Studio 2005. The MDG Integration for Visual Studio 2005 taskes the high-level modeling power of Enterprise Architect and the Unified Modeling Language and directly integrates it with Visual Studio .NET 2005

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MDG Integration for Visual Studio 2005

Introduction

by Tom O'Reilly

MDG Integration for Visual Studio 2005 takes the high-level modeling power of Enterprise Architect and the Unified Modeling Language, and directly integrates it with Visual Studio .NET 2005

MDG Integration for Visual Studio 2005

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Foreword

MDG Integration for Visual Studio 2005 takes the high-level modeling power of Enterprise Architect and the Unified Modeling Language, and directly integrates it with Visual Studio .NET 2005

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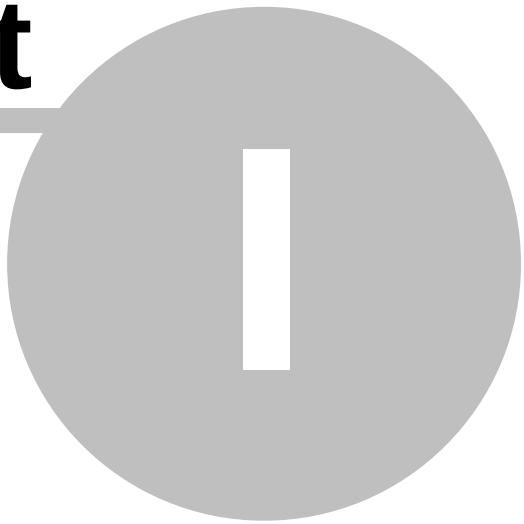
Part

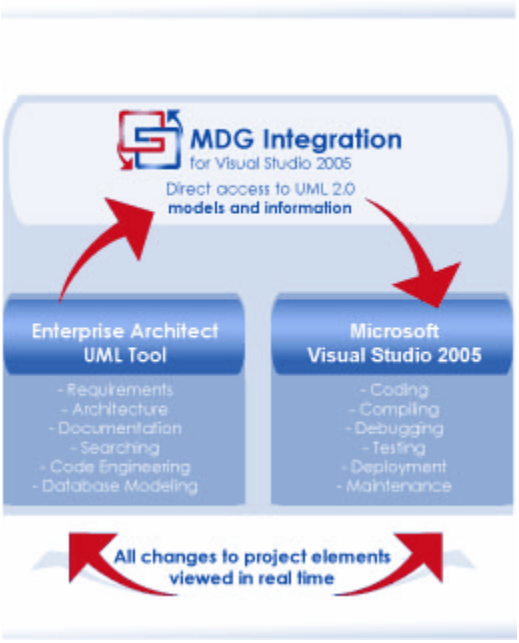


1 Introduction

Welcome to the Enterprise Architect MDG Integration for Visual Studio 2005. This set of tools takes the high-level modeling power of Enterprise Architect and the Unified Modeling Language, and directly integrates it with Visual Studio .NET 2005

At a glance:

- Provide the UML Analyst/Designer/Architect with the tools to build detailed and precise UML 2.0 models
- Give the Visual Studio developer focused access to UML model content
- Offer the development team strong traceability features, from requirements to model, to code, to tests and finally to deployed artifacts
- Increase productivity by linking UML models to Domain Specific Language (DSL) tools and artifacts



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1.3 Usage

The MDG Integration for Visual Studio 2005 brings together the model-and-design aspects of Enterprise Architect and the UML with all the power of Visual Studio .NET 2005.

Architects and Engineers can communicate directly and efficiently within the Visual Studio environment, Engineers can see exactly which project elements they are working on and how they relate to the rest of a system. Model elements appear in a special EA window within Visual Studio. Navigation from code->model only takes a mouse-click, and does not require leaving the Visual Studio interface.

An example work flow would go like this:

Architect and designers prepare the model. In this case we will say that the model resides in a central database. Then, specific coding tasks are assigned to the software engineers. The engineers can view the model from within Visual Studio .NET. Once assigned a task, an engineer can locate all the model elements within their task domain, along with any notes made by the Architect.

All the team members involved on the project can use the inbuilt Forum function to swap notes and files. Not only does this facilitate communication amongst team members, but helps to keep track of progress and

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changes to a project.

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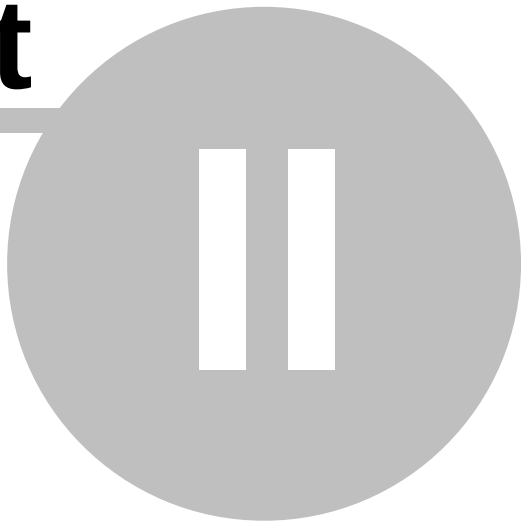
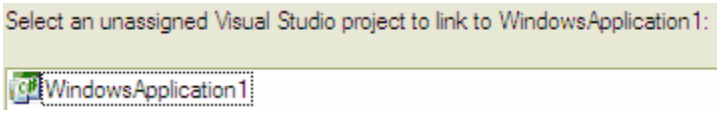


2 Getting Started

To link a Visual Studio 2005 solution with an Enterprise Architect model Package, follow these steps:

- Create a new model package in the EA Project View. Give the package a meaningful name.
- Now, link the package to a visual studio project by right clicking on the package and select *Current Package* | *Link to Visual Studio Project*. You will see your currently active solutions in the Connect Project Dialog.
- Select which solution you would like to link with the EA file, and click ok.



When a package has been linked, this status is indicated by a Visual Studio icon next to the package name. The UML package and the Visual Studio solution are now integrated, allowing you to work using the UML model and the powerful toolset of Enterprise Architect, all from within Visual Studio .NET

See also Multiple Linkings

2.1 Multiple Linkings

It is possible to link many different Visual Studio projects with multiple UML packages simultaneously. Right click on the Package in the Project View and select *Current Package* | *Import Visual Studio Projects*.

Clicking on Ok will then reverse engineer the project(s).

Once the Integration Environment has successfully imported and linked the projects, you will be able to view them in the Enterprise Architect Project View.

2.2 Adding an .EAP file

Adding an .EAP File

To use the MDG Integration for Visual Studio, you will need to attach an Enterprise Architect model to your solution. Once you have attached a model you can link your Visual Studio 2005 Project(s) to UML Packages.

To add an Enterprise Architect Model into the Visual Studio 2005 solution as a new solution item, simple right click on the solution and select Attach UML Model. You will then be presented with the "Attach a UML Model to Solution Dialog".

To select a model, you have one of three options:

1. Attaching an Existing Model

2. Creating a new Model

3. Connect to a Server Repository

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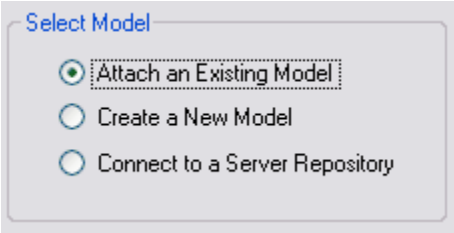


Details:
Attaching an Existing Model
Creating a new Model
Connecting to a Server Repository

2.2.1 Attach Existing

Attach Existing

When you select the attach existing Model option, you are presented with a "Select the name and location of the EA model" dialog. Browse your local or networked file system and select the .EAP file you wish to attach then click Open.

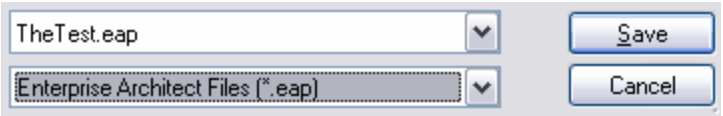
Once your EAP has been added you will be able to view it under the "Solution Items" in the "Solution Explorer". You will also notice a new view has been added to your view tab - the "EA Model View".

2.2.2 New Model

Create a new Model

This option is used if you do not have an existing Enterprise Architect UML model, and whish to start building with Visual Studio 2005 and the MDG integration.

When you select Create a New Model and click OK, you will be presented with the "Select the name and location of the EA model" dialog. Browse to the position in the file system you wish to store your new EAP file, and give it a name:



Once your EAP has been added you will be able to view it under the "Solution Items" in the "Solution

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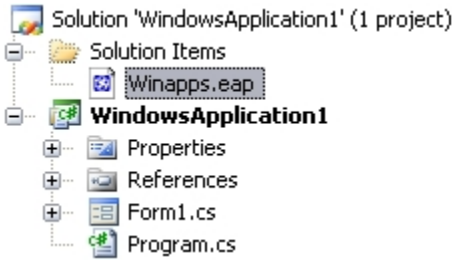
Explorer". You will also notice a new view has been added to your view tab - the "EA Model View".



2.2.3 Server Repository

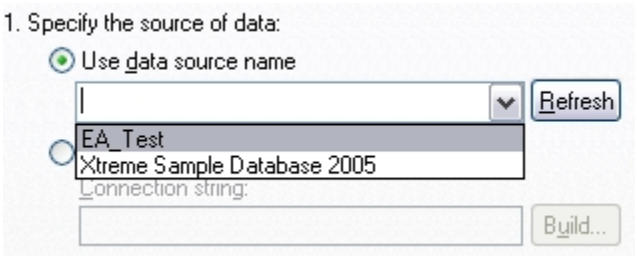
Connecting to a Server Repository

This option is used if you have an existing Enterprise Architect UML model stored on a SQL Server or other DBMS, and whish to start using that model with Visual Studio 2005 and the MDG integration.

When you select Create a New Model and click OK, you will be presented with the "Select the name and location of the EA model" dialog. Browse to the position in the file system you wish to store your new EAP file, and give it a name:

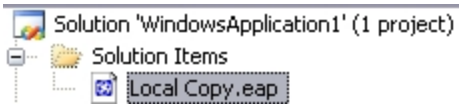
Note: *Make sure you have your data source defined in your system data sources first. In this example we will connect to a MySQL database.*

Once you click save you will be presented with the Data Link Properties Dialog. Select the Connection Tab and drop down the data source names.



Enter in the username and password for the database (if required) and click the OK button. If the connection settings are ok you will receive the Connection Name & Type . Enter a name you wish to call the link and click OK.

Once your EAP has been added you will be able to view it under the "Solution Items" in the "Solution Explorer". You will also notice a new view has been added to your view tab - the "EA Model View".



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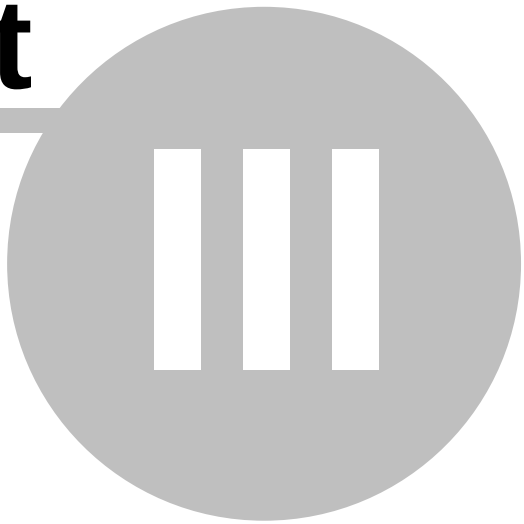


3 Start Using UML 2.0

Start Using UML 2.0

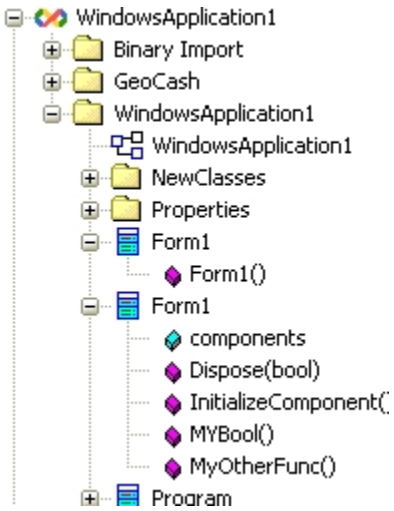
The MDG Link for Visual Studio .NET comprises of the following main components:

- The Model Page Displays the Diagrams and UML properties of the Elements. Most of the report information from the MDG Integration for Visual Studio 2005 will be displayed on this page. This page is also used to access the Search Tool, Forum, and Help using the tabs that appear near the top of the window.
- The Search Tool is used to find UML Elements. Search returns are shown as a report view with clickable items.
- The Forum Browser gives you the ability to discuss projects using a BBS-style Forum interface from within Visual Studio .NET
- The EA Project View shows each of the UML Elements, packages and diagrams in a hierarchical view.
- Help - Access to the HTML based help for quick reference.

To activate the components once you have installed the MDG integration, simply go to the View menu within Visual Studio .NET, and select Enterprise Architect.

To begin using the UML elements in Visual Studio, you must first link a Model file into Visual Studio, and assign it to a Visual Studio solution. See Linking To a Model Package for instructions on how to do this.

This will activate the two Enterprise Architect interface components - The EA Diagram View and the EA Project view.
The EA Project View contains an explorer style representation of the UML model in the form of a tree. As you can see below it lists the UML Packages, Diagrams, Elements, Attributes and Methods.



If you double-click an Element in the project view its contents will be displayed in the diagram view.

3.1 Model Page

This page shows the currently selected model element or diagram.

In the top left corner of the window is displayed the element name. Use the expand/collapse twisties next to the name to show more detail about the current element, such as *creation* and *modified* dates.

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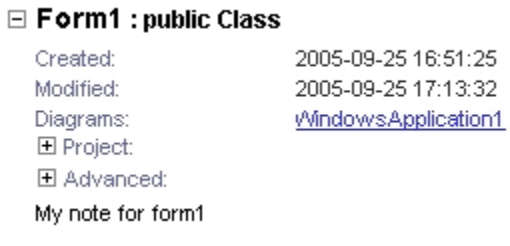
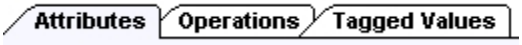
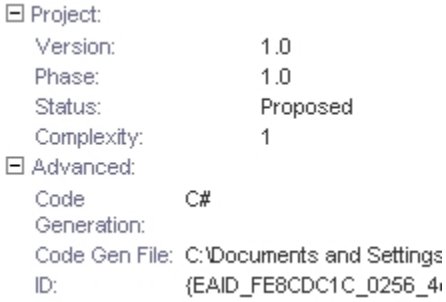


s

- Clicking on an element in the diagram expands that element. For instance, clicking on a package in a diagram will expand the view to show the contents of that package.
- Clicking on a class element will take you to the class browser interface which shows the attributes, operations, and associations of that class.



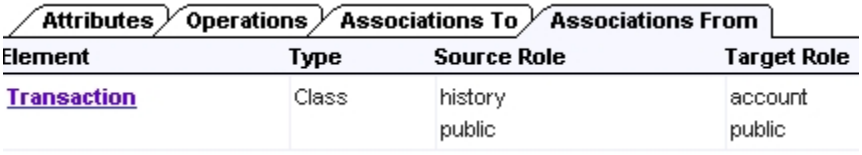
For each element that you display in the EA Diagram View, you can also see its Attributes, Operations, Tagged Values & Associations - both To and From.
Additional information can be seen by expanding the twisties for Project and Advanced, including ID numbers and versioning.



3.1.1 Hyperlinks

Navigating Hyperlinks

Within the EA Diagram View, you are able to navigate between diagrams and sections using the hyperlinks, Below you can see the Associations From tab, here Transaction is hyperlinked.



If we now click the Transaction Hyperlink, it will take us to the Transaction class page. For arguments sake we can now select the Associations To tab and see the link back to the Account class. This simple navigation is not unfamiliar to webpage navigation.

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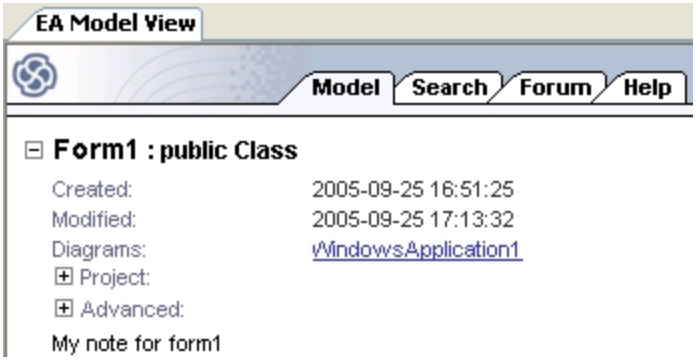
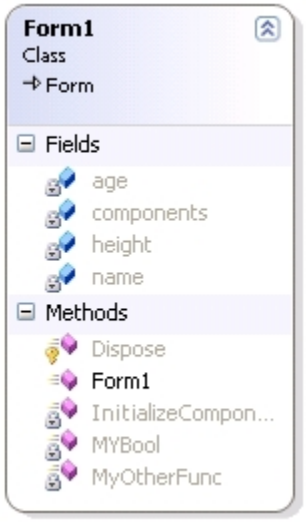
3.1.2 View UML diagrams

Using the hyperlinks in the diagram view, you can also navigate to view the UML models themselves. To do this, click on the Diagrams hyperlink. In this case it is WindowsApplication1



From the above image click on the WindowsApplication1 Hyperlink to get the corresponding UML diagram. You can also add your elements into new Visual Studio Class diagram. This is done by right clicking on an Element inside a linked folder, and selecting the View Class Diagram option.

You will notice you can view the details of the Class including its Attributes and Methods, all taken from Enterprise Architect.



3.2 Search Tool

The Search Tool is a convenient way of locating elements of a model. The user may search on a range of criteria, from element name, type, and scope to element connections, or status within a project (work-in-progress, completed, etc.)

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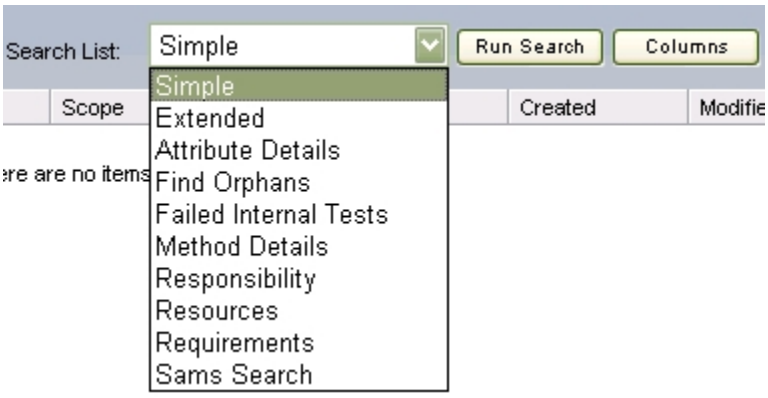


To begin a search, bring up the search page by clicking on the Search tab. In the Search Terms input box, enter the term(s) you wish to search for, and then click on Run Search.

Each of the returned results can be clicked on and Visual Studio will navigate to the respective item, similar to the hyperlinks.

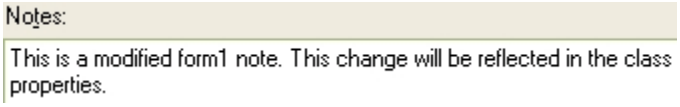
Object
Type
Stereotype
Manage User Accounts
Requirement
The system is required to store and maintain a list of client accounts
Remove User
Requirement
It is required that users within the repository may be deleted if requir
delete is a logical delete only.

You also have the ability to specify what columns will be returned. Click on the Columns button to display a list of the information that will be returned. To turn a column on or off, simple check or uncheck the box next to the column title.

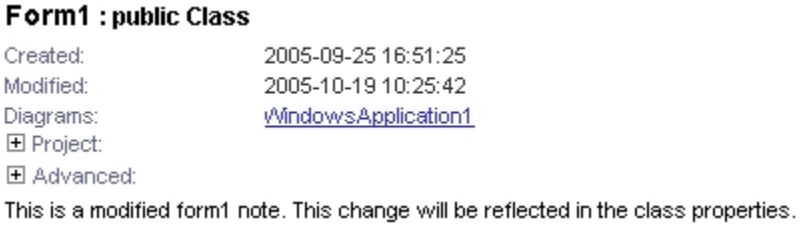
3.3 Edit UML diagrams

Edit UML diagrams

The Editing of the UML elements is also possible from the Class diagram. To bring up the UML properties simply right click on the element in the EA Project View and select Properties. Modifying any information in the properties will be automatically reflected in the model over the changes are applied. In this example the Notes of form1 have been modified.



Now you can see the change reflected in the diagram view below:



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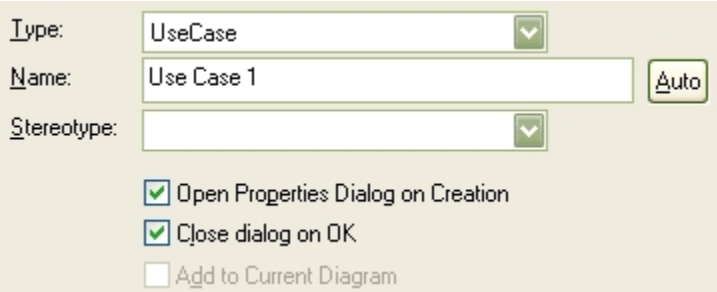
For a full listing on the each of the property tabs, please see here.

3.4 New Packages

Add New Package

Enterprise Architect for Visual Studio 2005 also lets you add new elements and packages to the model. To start, select the package you wish to create your new package under. We will use the Design Model package shown below. Right click and select Add | New Package then give it a relevant name.

Now we can right click on the newly created package and select Add | New UML Element. The Insert New Element dialog will be be displayed. In this example case we will select the Type as UseCase and we will give it a name of Use Case 1.



Checkboxes:
Open Properties Dialog on Creation - Use this option if you wish to tailor your elements information.
Close Dialog on OK - Closes the Insert New Element Dialog when the OK button is clicked, uncheck this option if you wish add multiple elements in one go.
Add to Current Diagram - Add the newly imported class to the open diagram.

One you click ok you will get the UML Element properties window. For more information on this window, see here.

3.5 Editing Diagrams

You can easily edit the UML diagrams in your project by right clicking on an Element, Package or Diagram and selecting Open in Enterprise Architect.
We can now see and edit the diagram within EA:

You can add new elements and give them their own attributes, operations, types etc. and customize / arrange them.

When you are finished, Simply click the Close EA button to return to your project where you can access the modified UML diagram and the modified class with their new elements and attributes etc..

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Part

4 Project View

The Enterprise Architect Project View helps you navigate your UML diagram from within Visual Studio .NET. Right-clicking on an item in the tree will open a context-sensitive menu that allows you to investigate the item or to perform operations on it. From this Project menu you can also perform other actions such as:

Browse UML
View Properties
Open in Enterprise Architect
XML Services
Code Generation
Model Driven Transformation

4.1 Diagram Properties

Right-Clicking on a diagram in the EA Project View and selecting Properties will bring up the diagram properties dialog.

From this dialog you can change the Name, Author, Version etc. For a more detailed explanation of this dialogs functions, please see here.

See Also
Set Appearance Options
Visible Class Members

4.1.1 Set Appearance Options

You can customize the appearance of a diagram in a number of ways. The following options can be set on the diagram dialog:

Option	Description
Use Stereotype Icons	Toggle the display of stereotype icons in the current diagram. This only applies to stereotypes with icons internal to EA, i.e. Analysis stereotypes and Business Modeling stereotypes.
Show Page Border	Show a page border to align elements with.
Show Table Owner	Displays the Table Owner, more information relating to this Topic may be found in the Set Table Properties section.
Use Alias if Available	Use element alias as name if the alias is specified.
Hide Property Methods	Hide the property methods.
Hide Collaboration Numbers	Hide numbering in collaboration diagrams.
Hide Element Stereotype	Hide the element stereotype.
Hide Qualifiers	Hide the qualifiers from the current diagram.
Highlight Foreign Objects	Highlight objects from other packages.
Show Package Contents	Show icons for the contents of packages displayed in the current diagram.
Show Details on Diagram	Show some diagram details in a note on diagram.
Show Sequence Notes	Show the Sequence Notes on the current diagram.
Hide Additional Parents	Hide the explicit naming of parents in classes and interfaces.
Hide Relationships	Hide all relationships in the current diagram.

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Hide Stereotype on Features	Hide all Stereotypes on features.
Hide Attributes	Hides the display of Attributes from the compartment enabled element, for more details see the Show or Hide Attributes and Operations topic.
Hide Operations	Hides the display of Operations from the compartment enabled element, for more details see the Show or Hide Attributes and Operations topic.
Show Tags	Show the tag compartment for elements that support it and have tags.
Show Requirements	Shows requirements in compartment enabled elements in a requirements compartment.
Show Constraints	Shows constraints in compartment enabled elements in a constraints compartment.
Show Testing	Shows test scripts in compartment enabled elements, for more details see the Show Testing Scripts topic.
Show Maintenance	Shows maintenance scripts in compartment enabled elements, for more details see the Show Maintenance Scripts topic.

4.1.1.1 Visible Class Members

The visible Class Members section of the diagram properties dialog Appearance Options is used to determine the visibility of class members and also determine the details shown for parameters. Use the checkboxes to select the visibility of class members. the options include Public, Protected, Private and Package.

Show Parameter Detail

The Show Parameter Detail dropdown allows the user to control the display of the Parameter details theses are:

None	No details shown
Type Only	Shows only the type of parameter.
Full Details	Shows all of the details for parameters
Name Only	Shows the name of the parameter only.

4.2 Element Properties

This topic covers element properties and their settings, responsibilities, constraints, links, scenarios, tagged values, associated files, object files and classifiers and boundary element settings.

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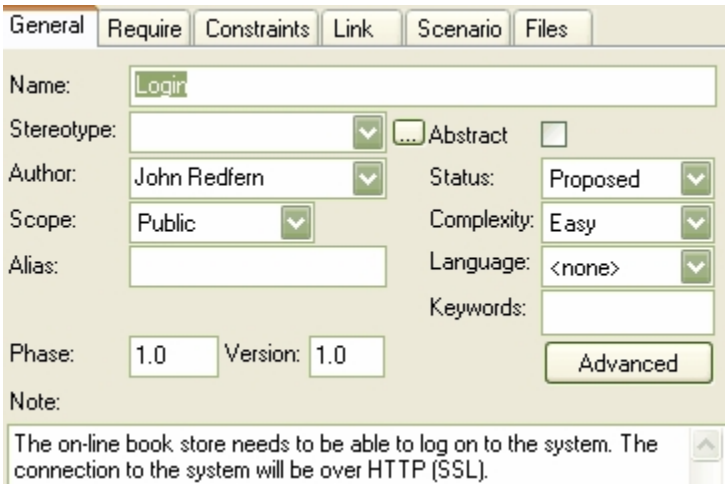

See Also:
Properties
General Settings
Advanced Settings
Requirements
External Requirements
Constraints
Links
Scenarios
Tagged Values
Associated Files
Object Classifiers
Boundary Element Settings.

4.2.1 Properties

Any one of the following options allows you to view this dialog:

- Select an element in the diagram view and select *Properties...* from the *Element* menu.
- Right click on an element in the diagram view, and select *<element type> Properties* from the context menu.
- Select an element in the diagram view, and press *Alt+Enter*.
- Double-click on an element in the diagram view.
- Right click on an element in the Project Browser, and select *Properties...* from the context menu.

Below is the *Element Properties* dialog:

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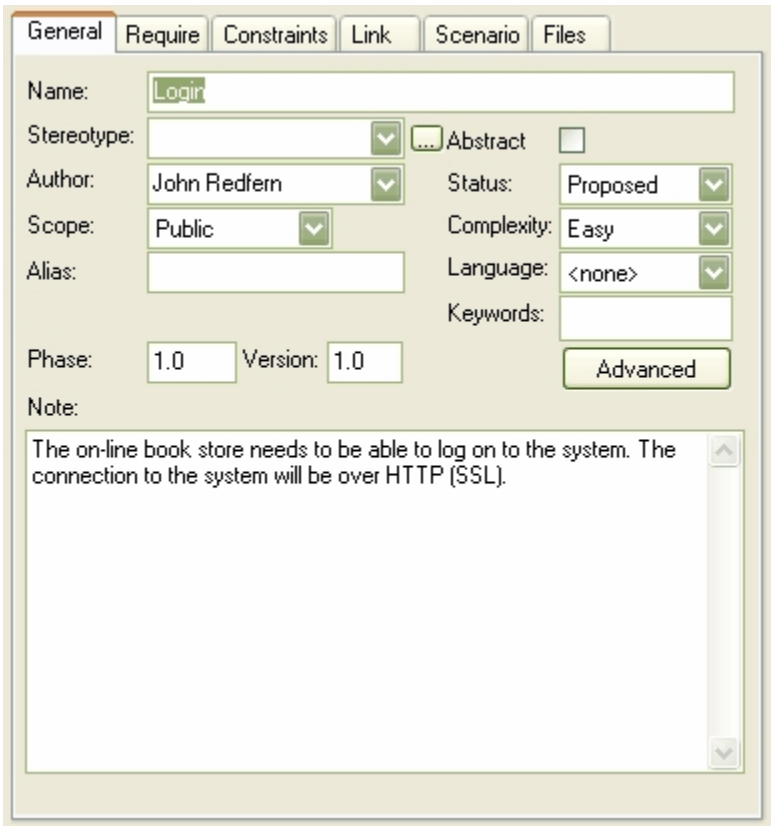

4.2.2 General Settings

General Tab of the Element Properties Settings

Control	Description
Name	Change the element's name
Stereotype	Select a stereotype for the element (optional)
Abstract	Check to indicate element is abstract
Author	Enter or select the name of the original author
Status	Indicate the current status of the element (eg. Approved, Proposed...)
Scope	Indicate the element's scope (public, private, protected, package)
Complexity	Indicate the complexity of the element (used for project estimation). Assign Easy, Medium or Hard
Alias	Enter an alias (alternate display name) for the object.
Language	Select the programming language for the object
Keywords	A free text area that may be filtered in Use Case Metrics and Search dialogs - typically used for keywords, context information etc.
Advanced button	See Advanced Settings for details
Phase	Indicate the phase this element will be implemented in (eg. 1, 1.1, 2.0 ...)
Version	Enter the version of the current element
Notes	Enter any free text notes associated with the element

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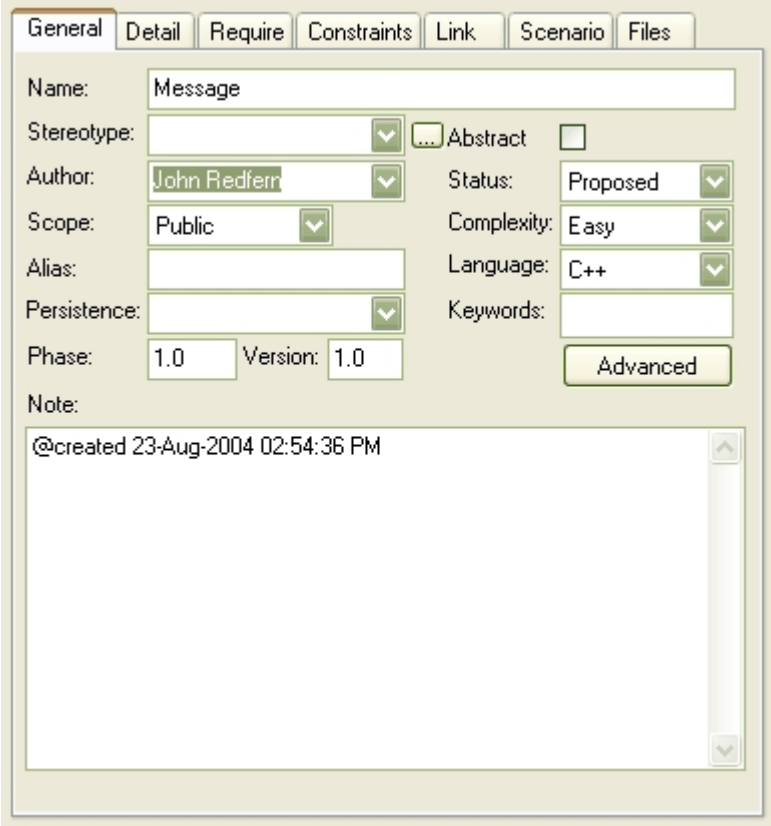
The *General* tab of the *Element Properties* dialog is shown below:



4.2.3 Advanced Settings

Some elements support some additional attributes. These are Generalizable elements - and by pressing *Advanced* on the *Element Properties* dialog you can set the following:

- *IsRoot* - the element is a root element and may not be descended from another
- *IsLeaf* - the element is 'final' and may not be a parent for other elements
- *IsSpecification* - the element is a specification
- *IsActive* - the element is active - eg. an active class
- *Multiplicity* - multiplicity setting for the element

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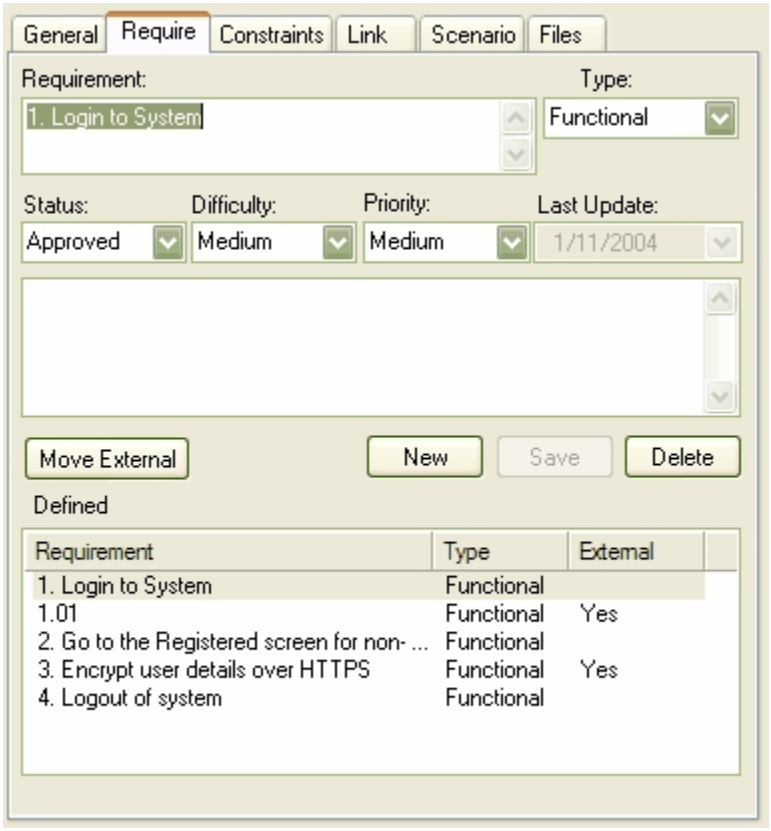
4.2.4 Requirements

The *Require* tab of the *Element Properties* dialog is shown below. Use this page to create requirements that this element is designed to meet. Requirements are of two types - internal requirements (responsibilities) and external requirements (system requirements). EA will show both types, but you can only edit the internal type from this tab.

These form the functional requirements of the system to be built. The meaning of the requirement may vary depending on which element is the host - for example a business process requirements may mean something different to a Use Case requirement, which again may mean something different to a Class requirement. Use these as best suit your needs.

Use the Specify Feature Visibility function to show Requirements for an element on the diagram directly (it is also possible to show inherited Requirements in this fashion).

Note: *External requirements are those linked to this element using a Realization link*



Control	Description
Requirement	Name and high level detail of requirement
Type	Functional, non-functional etc.
Status	Current status of requirement
Difficulty	Complexity of implementing current requirement
Priority	How urgent the requirement is
Last update	Date of last requirement update
Notes	Details of requirement
Defined requirements	List of defined requirements associated with element

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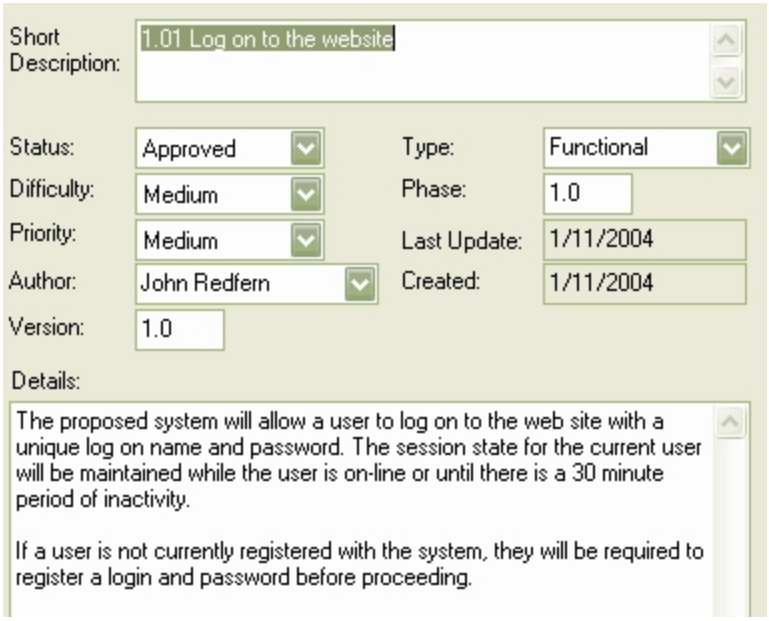
4.2.5 External Requirements

External requirements are those requirement elements that have been linked to the current element using a Realization link. By creating the link from the element to the requirement, the element now has a responsibility that it must implement as part of the system solution.

In Enterprise Architect, linked requirements are shown in the *Require* tab of the *Element Properties* dialog - but they are marked external and cannot be directly edited (on selection, the tab fields are grayed out).

Double click an external requirement in the list to activate the *Properties* dialog for the associated requirement, where you can view and modify the requirement details and check the requirement hierarchy details.


Short Description:
1.01 Log on to the website
Status:
Approved
Type:
Functional
Difficulty:
Medium
Phase:
1.0
Priority:
Medium
Last Update:
1/11/2004
Author:
John Redfern
Created:
1/11/2004
Version:
1.0
Details:
The proposed system will allow a user to log on to the web site with a unique log on name and password. The session state for the current user will be maintained while the user is on-line or until there is a 30 minute period of inactivity.
If a user is not currently registered with the system, they will be required to register a login and password before proceeding.

4.2.6 Constraints

The *Constraints* tab of the *Element Properties* dialog is shown below. Elements may have associated constraints placed on them. These are conditions under which the element must exist and function. Typical constraints are pre- and post- conditions which indicate things that must be true before the element is created or accessed and things which must be true after the element is destroyed or its action complete. Use the Specify Feature Visibility function to show Constraints for an element on the diagram directly (it is also possible to show inherited constraints in this fashion).

Adding Constraints to a Model Element

To add constraints to a model element, follow the steps below:

1. Open the *Element Properties* dialog.
2. Select the *Constraints* tab.
3. Enter constraint details.

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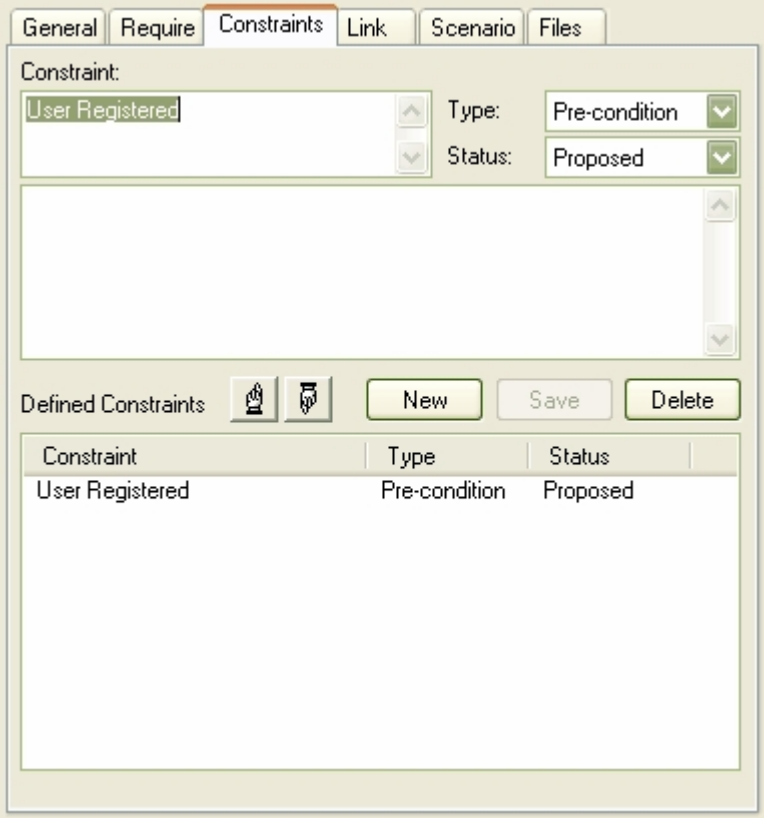
4. Enter the *Type* and the *Status*.
5. Enter optional notes.
6. Press *Save*.



Constraints are used in conjunction with responsibilities to define the conditions and rules under which an element operates and exists.

Constraint	Details of Constraint
Type	Pre-condition, post-condition or invariant
Status	Current constraint status
Notes	Free text notes associated with constraint
Defined constraint	List of defined constraints

4.2.7 Links

The *Links* tab of the *Element Properties* dialog is shown below. This displays a list of all connectors active for the current element. You may delete a connector here if required. Using the right click context menu you may also locate the related element in the Project Browser.

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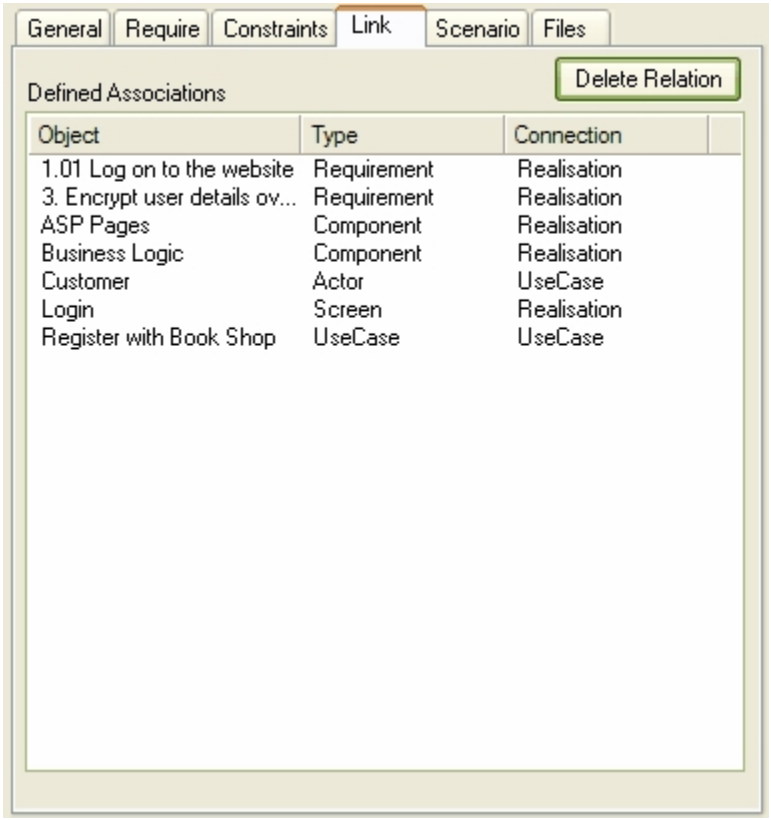

Control	Description
Defined Associations	List of relationships this element has
Delete relation button	Delete the selected relation
Object	The element this element is related to
Type	The type of the related element
Connection	The relationship type

4.2.8 Scenarios

The *Scenario* tab of the *Element Properties* dialog is shown below. A scenario is a real world sequence of operations that describes how this element works in real-time. It may be applied to any element and can describe functional behavior, business work flows and end-to-end business processes.

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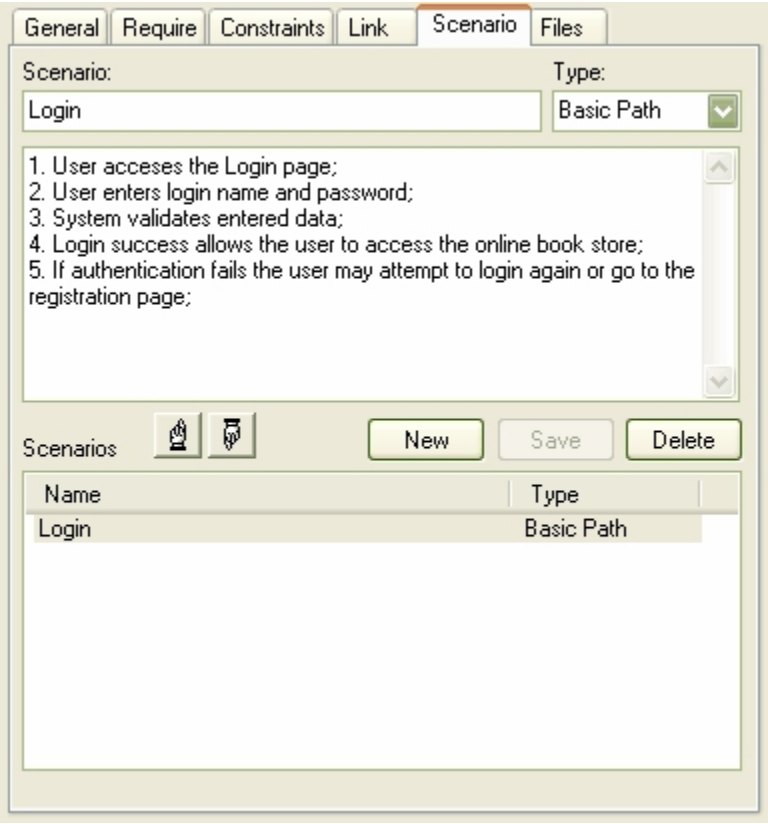

Control	Description
Scenario	Name of scenario
Type	Basic path, alternate path etc.
Notes	Textual description of the scenario - usually depicted in steps of how the user will use the current element
Scenario list	List of defined scenarios

4.2.9 Associated Files

The *Files* tab of the *Element Properties* dialog is shown below. An element may be linked to files held somewhere. Use this tab to set associated files for the current element.

Tip: *Linked files are a good way to link elements to additional documentation and/or source code.*

Note that you can also insert hyperlinks in diagrams to other files - and launch them directly from the diagram. This is an alternative method to that described here.

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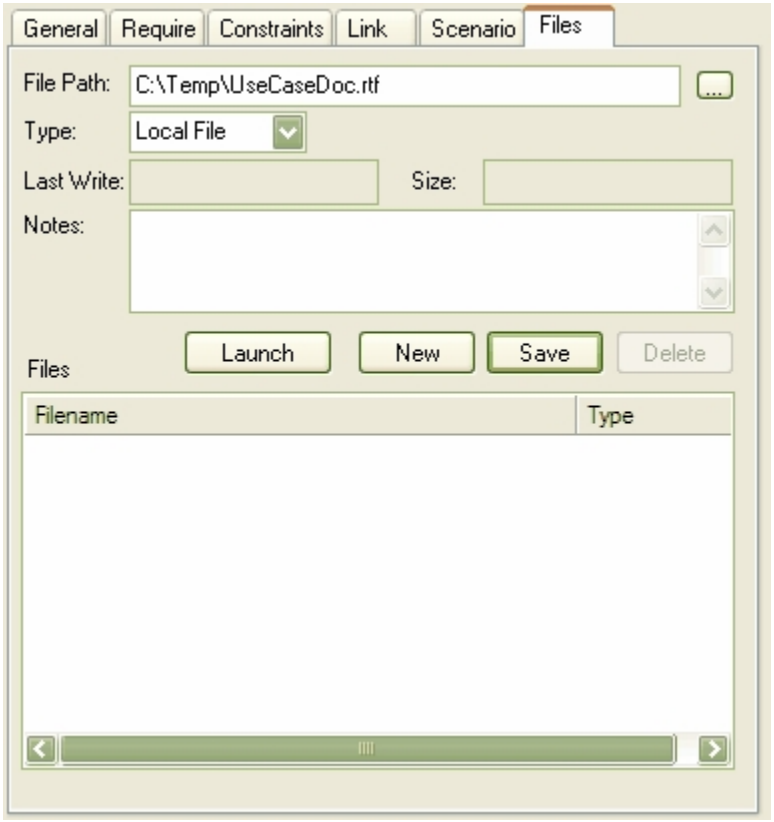

Control	Description
File path	Name of file
Type	Local file or web address
Notes	Free text about the file
Attached files	List of file
Launch	Open the selected file - local files will open with their default application and web files will open in the default browser

4.2.10 Boundary Element Settings

A system boundary element is a non-UML element used to define conceptual boundaries. You can use boundaries to help group logically related elements (from a visual perspective, not as part of the UML model)

Configuring Boundary Elements

Boundary elements may be configured to display in different ways. The main differences are:

- Solid border
- Dotted Border

With horizontal or vertical 'swim lanes' - swim lanes are used to group elements in a vertical or horizontal context (eg. Client, Application and Database tiers could be represented in swim lanes)

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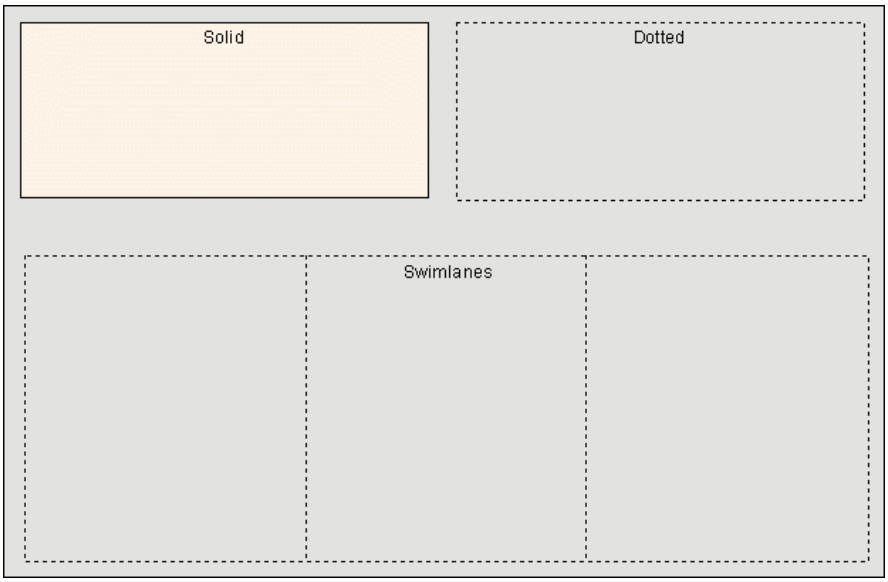

4.2.11 Tagged Values

Tagged values are a convenient way of adding additional information to an element outside that directly supported by UML. The UML provides the Tagged Value element for just this purpose. Often these are used during code generation or by other tools to pass information or operate on elements in particular ways. For more information relating to using tags see The Tagged Values Window topic.

Add a Tagged Value

To add a tagged value for an element,use the following the steps :

1. Ensure the *Tagged Values* window is open by selecting *View* |*Tagged Values* (or press the *Ctrl* + *Shift* + *6* hotkey combination).
2. Select the element by double clicking on the element in a diagram or on the element in the Project View.
3. The *Tagged Values* window will now have the operation selected, press the *New Tag* button.
4. Define the tag in the *Tag* field (or select a custom defined tag from the drop down list), then add notes as appropriate to the *Note* text entry field.
5. Then press *OK* the button to confirm the operation.

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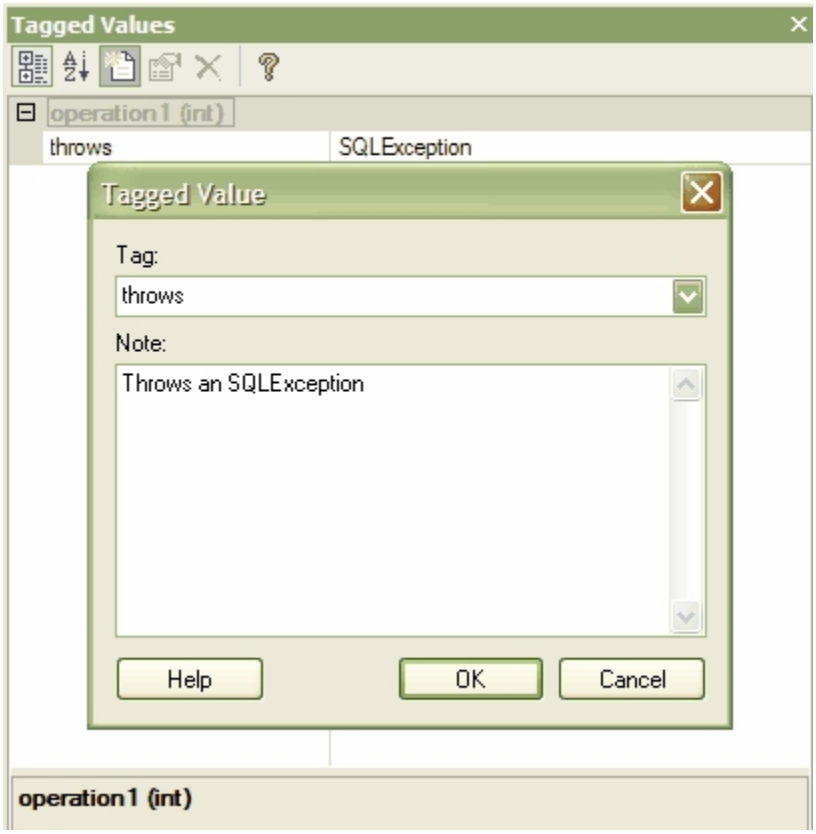

Tip: *Custom tags may be defined by creating a custom tagged value type for more information refer to the Creating a Custom Tagged Value Type section.*

Tagged Values are the preferred method of extending the code generation capabilities of the CASE tool on a per element / per language basis. In future, EA will support more tagged values for different languages.

4.2.11.1 Tag Management

Tagged Values can also be managed within a type hierarchy and with respect to element instances. This additional management is done using the *Tag Management* dialog.

Using the *Tag Management* dialog it is possible to:

1. View tagged values inherited from parent classes or realized interfaces or applied stereotypes.
2. Override Tagged Values derived from parents or applied stereotypes with a unique value for the current element.
3. Delete tagged values from the current element (if a parent version of the Tagged Value exists, it will re-appear in the list after the override is deleted).

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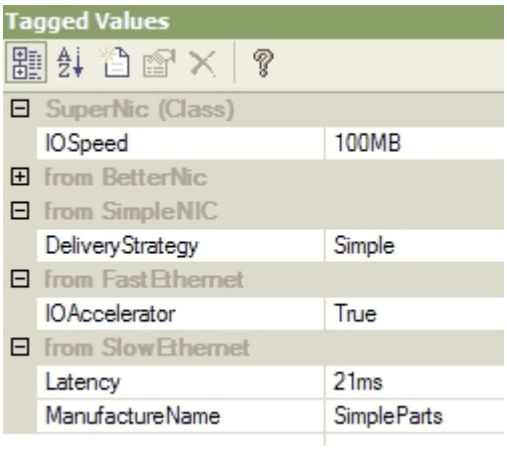

The diagram below illustrates a complex tag hierarchy and the way tagged values can be either inherited or overridden in specialized classes to create the final tagged property set for an element.

Note also that a similar concept applies to instances - in which case the full tag set is created from the directly owned tags, plus all of those merged in from the classifiers type hierarchy, additional stereotypes and realized interfaces.

4.2.11.2 Fast Tagged Values

It is possible to add a single tagged value to one or more elements with a special shortcut.

1. From an element context menu (or the context menu of a multi-selection) - choose the *Element Features* | *Add Tagged Value* option. (Alternatively, select one or more elements and press *Shift+Ctrl +T*).

2. The Tagged Values window will appear - press the New Tag button,
3. This will allow the entry of a *Name for the tag* (required) and *Notes*.
4. To add a value for the tag by entering a value in the values section of the *Tagged Values Window* (which will be initially blank).
5. Press *OK* to add your new tagged value to all the currently selected elements.

Note: *You can also use the Current Element toolbar ... the last button is a shortcut to the Add Tagged Value function.*

To delete this property you must open the element property dialog, go to the *Tagged Values* tab and manually delete the item. There is currently no shortcut to delete tags from multiple elements at one time.

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The Notes section will appear in the Tagged Values window in the Info section at the bottom Tagged Values window.

4.2.12 Object Classifiers

Many elements in UML model instances of classes - for example, objects, actors and sequence diagram objects. These elements represent real things in a run-time scenario - eg. a Person element named Joe Smith. In UML this is written as "Joe Smith : Person".

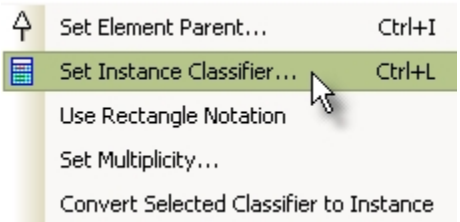
As the model develops from a rough sketch to a detailed design, many objects will become examples of defined classes - so in the early analysis phase you may model a "Joe Smith" and a "Jane Smith" - and later a "Person" class from which Joe and Jane will be instantiated.

Enterprise Architect allows you to associate an object with its template or class (its classifier). Doing this greatly increases the descriptive power of the model in capturing the functionality and responsibility of objects at run-time and their associated state. For example, if we describe a Person class with attributes such as Age, Name, Address and Sex, and functions such as GetAge, GetName etc., then when we associate our object with the Person class it is seen to have all the Person class behavior and state (as well as inherited state and behavior from Person's ancestors).

Tip: *This is a powerful means of moving your model from the analysis phase into detailed design.*

4.2.12.1 Using Classifiers

Objects which support classifiers have the option *Set Instance Classifier* in the *Advanced Settings* sub-menu of their diagram view context menu. Select this option to choose a single class as the classifier or template for this object.



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When you do this, the object name will be displayed as "Object : Class" - for example a Person object named Joe Smith will be displayed as "Joe Smith : Person".

Several Changes Occur if an Object has a Classifier:

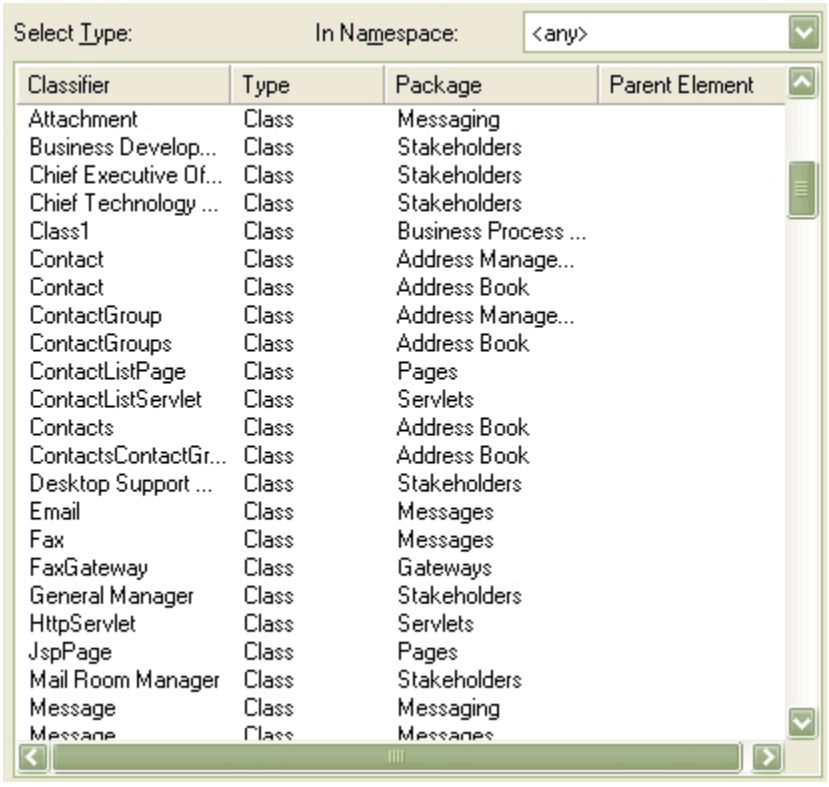
In the context menu for the object, the *Element Features* | *Attributes* and *Element Features* | *Operations* menu items will appear. If you select either of these, you will be given the *Attributes* or *Operations* dialog for the classifier, not the object. It is important to remember that the object is only an instance of a class at runtime, so the appropriate attributes and operations are those of the classifier, not the object.

If you set the classifier for an object in a sequence diagram, when you add a message the drop down list of available messages derived from the target object will come from the classifier - not the object selected. This allows you to associate sequence diagram objects with classes and use the defined behavior of the class to model actual behavior at run time.

You may also select a message for a state flow connector. The same rules apply as for sequence objects.

Note that in the message dialog you may also elect to include messages defined in the target classifiers inheritance hierarchy.

The *Set Element Classifier* dialog is shown below. Select the desired item in the list and press *OK* to set the instance classifier.



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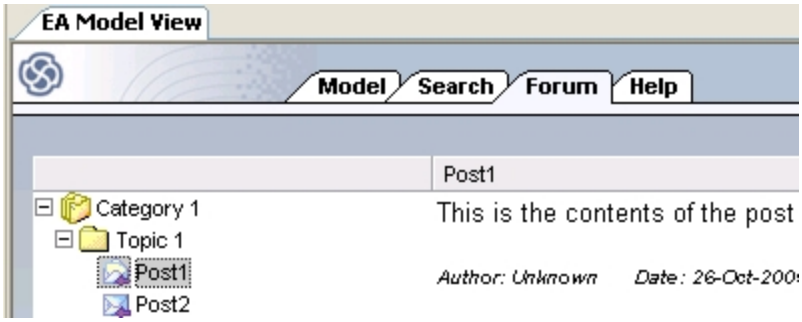
Part V

5 Project Discussion Forum

The *Project Discussion Forum* can be used to discuss the development of your project. The forum window consists of two main areas, the message thread area, the message contents area. The message thread area which is located in the left hand side is used to create new categories and topics and to edit and delete messages. The message contents section is used to view discussion topics and is located on the right hand section of the discussion forum.

You can access the *Project Discussion Forum* via the EA Model View and selecting the *Forum* Tab



See Also
- Categories, Topics and Posts
- Message Dialog

5.1 Forum Usage

The Project Discussion Forum allows users to create *Categories* which contain *Topics* which contain *Posts*. Users also have the ability to reply to posts.

See Also
- Adding a New Category
- Adding a New Topic
- Adding a New Post
- Replying to a Post
- Editing a Post
- Message Dialog

5.1.1 Adding a New Category

To create a new *Category*, click on the *New Category* icon at the bottom of the page.

This will bring up the *Create New Category* dialog, Enter the name and any relevant details into the text field as well as the name of the author before pressing the *OK* button. New topics can now be added to the category, refer to section, Adding a New Topic.

See Also
- Message Dialog

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5.1.2 Adding a New Topic

To create a new *Topic*, click on the *New Topic* button from the bottom of the forum.

This will bring up the Create New Topic dialog, Enter the name and any relevant details into the text field as well as the name of the author before pressing the *OK* button. New posts can now be added to the topic, refer to section, Adding a New Post.

See Also
- Message Dialog

5.1.3 Adding a New Post

To create a new *Post*, click the *New Post* button from the bottom of the forum window.

This will bring up the Create New Post dialog, Enter the name and any relevant details into the text field as well as the name of the author before pressing the *OK* button. Users can now reply to post, refer to section, Replying to a Post.

See Also
- Message Dialog

5.1.4 Replying to a Post

To reply to a post, right click on a *Post* click the *Add Reply* from the context menu.

This will bring up the Reply to Post dialog. Enter the name and any relevant details into the text field as well as the name of the author before pressing the *OK* button.

See Also
- Message Dialog

5.1.5 Editing a Post

To edit a post, right click on a *Post* click the *Edit* button from the context menu or alternatively press [*Ctrl+E*].

This will bring up the Create New Post dialog, Enter the name and any relevant details into the text field as well as the name of the author before pressing the *OK* button. Users can now reply to post, refer to section, Replying to a Post.

See Also
- Message Dialog

5.2 Message Dialog

The project discussion forum message dialogs (*Create New Category*, *Create New Topic*, *Create New Post* and *Reply to Post*) all share the same functionality.

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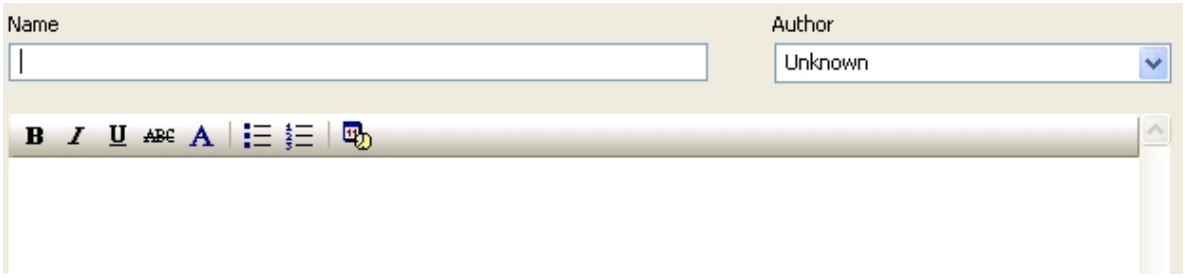

The table below describes the operation of each option available for the dialogs.

Control	Description
Name	The name of the message category or message topic.
Author	Use this drop down list to select the message author or type in a new Author if the Author name is not present in the list. The Authors in the drop down list are defined in the model Authors list. You can also type the authors name into this field. It will be use for this post, but will not save. (you will have to type it every time)
Formatting Tools	These are standard formatting options for text
OK	Confirm the forum message
Cancel	Cancel the forum message
Help	Brings up the help topic.

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Part

6 XML Technologies

MDG Integration for Visual Studio2005 enables the rapid modeling, forward and reverse engineering of two key W3C XML technologies : XML Schema (XSD) and Web Service Definition Language (WSDL). XSD and WSDL support is critical for the development of a complete Service Oriented Architecture (SOA), and the coupling of UML 2.0 and XML provides the natural mechanism for specifying, constructing and deploying XML based SOA artifacts within an organization.

The following topics explain how to work with these technologies using MDG Integration for Visual Studio 2005

- XML Schema (XSD)
- Web Services (WSDL)

6.1 XML Schema (XSD)

MDG Integration for Visual Studio2005 Forward and Reverse engineering of W3C XML schemas (XSD). The following topics explain how to use MDG Integration for Visual Studio2005 to model, generate and import XML schemas :

- Model XSD
- Import XSD
- Generate XSD

6.1.1 Model XSD

XML schemas are modeled using UML class diagrams within MDG Integration for Visual Studio2005.

The Class diagram below models simple schema for an example "Employee Details" system, intended to store a company's employee contact information. The classes shown form the "EmployeeDetails" package. The UML attributes of the classes map directly to XML elements or attributes. Note that the classes have no methods, since there is no meaningful correspondence between class methods and XSD constructs.

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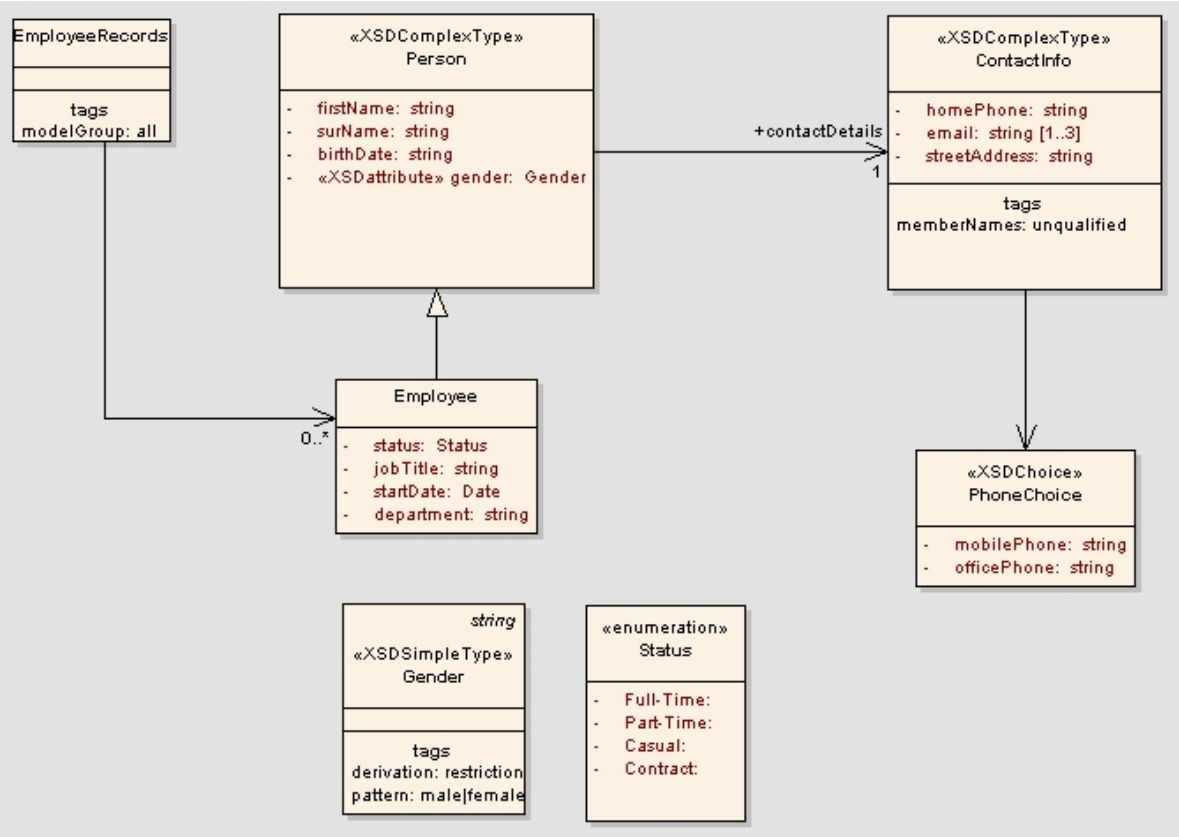

The following figure shows the schema which is generated for the Employee Details package by default. Notice how each UML class corresponds to a complexType definition in the schema. The class attributes are generated as schema elements contained in a "sequence" model group within the definition. The enumeration class is the exception here- it maps directly to an XSD enumeration, contained within a simpleType definition.

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
	<xs:simpleType name="Gender">
		<xs:restriction base="xs:string">
			<xs:pattern value="male|female"/>
		</xs:restriction>
	</xs:simpleType>
	<xs:element name="Person" type="Person"/>
	<xs:complexType name="Person">
		<xs:sequence>
			<xs:element name="Person.surName" type="xs:string"/>
			<xs:element name="Person.firstName" type="xs:string"/>
			<xs:element name="Person.birthDate" type="xs:string"/>
			<xs:element name="Person.contactDetails">
				<xs:complexType>
					<xs:sequence>
						<xs:element ref="ContactInfo"/>
					</xs:sequence>
				</xs:complexType>
			</xs:element>
		</xs:sequence>
		<xs:attributeGroup ref="Person.att"/>
	</xs:complexType>
	<xs:attributeGroup name="Person.att">
		<xs:attribute name="Person.gender" type="Gender"/>
	</xs:attributeGroup>
	<xs:element name="Employee" type="Employee"/>
	<xs:complexType name="Employee">
```

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```
                <xs:complexContent>
                        <xs:extension base="Person">
                                <xs:sequence>
                                        <xs:element name="Employee.status" type="Status"/>
                                        <xs:element name="Employee.jobTitle" type="xs:string"/>
                                        <xs:element name="Employee.startDate" type="xs:date"/>
                                        <xs:element name="Employee.department" type="xs:string"/>
                                </xs:sequence>
                        </xs:extension>
                </xs:complexContent>
        </xs:complexType>
        <xs:element name="ContactInfo" type="ContactInfo"/>
        <xs:complexType name="ContactInfo">
                <xs:sequence>
                        <xs:element name="homePhone" type="xs:string"/>
                        <xs:element name="email" type="xs:string" maxOccurs="3"/>
                        <xs:element name="streetAddress" type="xs:string"/>
                        <xs:choice>
                                <xs:element name="mobilePhone" type="xs:string"/>
                                <xs:element name="officePhone" type="xs:string"/>
                        </xs:choice>
                </xs:sequence>
        </xs:complexType>
        <xs:simpleType name="Status">
                <xs:restriction base="xs:string">
                        <xs:enumeration value="Full-Time"/>
                        <xs:enumeration value="Part-Time"/>
                        <xs:enumeration value="Casual"/>
                        <xs:enumeration value="Contract"/>
                </xs:restriction>
        </xs:simpleType>
        <xs:element name="EmployeeRecords" type="EmployeeRecords"/>
        <xs:complexType name="EmployeeRecords">
                <xs:all>
                        <xs:element name="EmployeeRecords.Employee">
                                <xs:complexType>
                                        <xs:sequence>
                                                <xs:element ref="Employee" minOccurs="0"
maxOccurs="unbounded"/>
                                        </xs:sequence>
                                </xs:complexType>
                        </xs:element>
                </xs:all>
        </xs:complexType>
</xs:schema>
```

6.1.1.1 UML Profile for XSD

The UML Profile for XSD specifies a set of **stereotypes**, **tagged values** and **constraints** which may be applied to the UML model in order to change particular aspects of the resulting schema. For example, we may wish to have certain UML class attributes converted to XSD attributes or, we may need to use a different model group than the default "sequence".

The XSD stereotypes provide an explicit mapping from XSD to UML constructs. The tagged values further define aspects of the mapping, such as whether the elements should be qualified. The constraints define any conditions that must be satisfied for the stereotype to apply.

The following table lists the features of the UML Profile for XSD. Tagged value names are shown in bold followed by the allowed values. If there is a default value used by EA's schema generator it is underlined.

<<XSDschema>>

UML Construct	Package

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Description	All classes in a package are defined within one schema. This stereotype can be used to specify schema-wide settings.
Tagged Values	
anonymousRole: (true | false)	Specifies if the role name is included in the element declaration for the UML attribute.
anonymousType: (true | false)	Specifies whether the class type is anonymous for attributes.
attributeFormDefault: (qualified | unqualified)	Determines whether attribute instances must be qualified.
defaultNamespace:	The default namespace used in this schema. This value is used to specify the default namespace attribute (xmlns=), in the schema element.
elementDerivation: (true | false)	Determines whether inheritances are generated using XSD extension or copy-down inheritance.
elementFormDefault: (qualified | unqualified)	Determines whether element instances must be qualified.
memberNames: (qualified | unqualified)	Determines whether elements generated from Class attributes have their name qualified by the corresponding class name.
modelGroup: (all | sequence | choice)	Specifies the default XSD model group used to generate complexType definitions.
schemaLocation:	The URI which identifies the location of the schema. This value is used in the import and include elements.
targetNamespace:	The URI which uniquely identifies this schema's namespace.
targetNamespacePrefix:	The prefix which abbreviates the targetNamespace.
version:	The version of this schema.
Constraints	None.

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<<XSDcomplexType>>

UML Construct	Class
Description	complexType definitions are created for generic UML classes. This stereotypes helps tailor the generation of a complexType definition
Tagged Values	
memberNames: (qualified | unqualified)	Determines whether elements generated from the UML class attributes and associations have their name qualified by the corresponding class name for this complexType definition.
mixed: (true | false)	Determines whether this element may contain mixed element and character content. Refer to the W3C XML Schema recommendation.
modelGroup: (all | sequence | choice)	Overrides the default XSD model for generating this complexType definition.
Constraints	None.

<<XSDsimpleType>>

UML Construct	Class
Description	An XSD simpleType is generated for classes with this stereotype.
Tagged Values	
derivation: (restriction | list)	Specifies the derivation of the simpleType. Refer to the W3C XML Schema recommendation.
length:	Refer to the W3C XML Schema recommendation.
minLength:	Refer to the W3C XML Schema recommendation.
maxLength:	Refer to the W3C XML Schema recommendation.
minInclusive:	Refer to the W3C XML Schema recommendation.
minExclusive:	Refer to the W3C XML Schema recommendation.
maxInclusive:	Refer to the W3C XML Schema recommendation.
maxExclusive:	Refer to the W3C XML Schema recommendation.
totalDigits:	Refer to the W3C XML Schema recommendation.
fractionDigits:	Refer to the W3C XML Schema recommendation.
whitespace:	Refer to the W3C XML Schema recommendation.
pattern:	Refer to the W3C XML Schema recommendation.
Constraints	This class can only participate in an inheritance relation with another simpleType. It cannot have any attributes or own any associations. They will be ignored if present.

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<<XSDsequence>>

UML Construct	Class
Description	The schema generator creates a sequence model group as the container for the attributes and associations owned by this class. The model group is in turn added to the model groups of this class' respective owners. Note: Tagged values specified by owners of this class persist through to the child elements of this model group. Thus if memberNames are unqualified for a complexType, so will be the children of this model group when added to that complexType.
Tagged Values	None.
Constraints	This class must be the destination of unidirectional associations. If it is not, this class and its connectors are ignored, possibly invalidating other model group classes. Inheritance relations are ignored for this class.

<<XSDchoice>>

UML Construct	Class
Description	Creates an XSD choice element. Refer to XSDsequence for more details.
Tagged Values	None.
Constraints	As for XSDsequence.

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<<XSDelement>>

UML Construct	Attribute; AssociationEnd
Description	By applying this stereotype to a UML class attribute or AssociationEnd, the corresponding UML entity is generated as an element within the parent complexType and not as an XSD attribute.
Tagged Values	
form: (qualified | unqualified)	Overrides the schema's elementFormDefault value.
position:	Causes the elements to be ordered within a sequence model group of the containing complexType. Duplicated and invalid position tagged values are ignored and result in undefined ordering of the UML attributes. Missing position values cause the defined positions to be allocated as specified, with the remaining elements filling the missing positions in an undefined order.
anonymousRole: (true | false)	Specifies if the role name is included in the element declaration for the UML attribute
anonymousType: (true | false)	Specifies whether the class type is anonymous for attributes.
Constraints	None.

<<XSDattribute>>

UML Construct	Attribute; AssociationEnd
Description	By applying this stereotype to a UML class attribute or AssociationEnd, the corresponding UML entity is generated as an XSD attribute within the parent complexType and not as an XSD element.
Tagged Values	
form: (qualified | unqualified)	Overrides the schema's attributeFormDefault value.
use: (prohibited | optional | required)	Refer to the W3C XML Schema recommendation.
default:	Refer to the W3C XML Schema recommendation.
fixed:	Refer to the W3C XML Schema recommendation.
Constraints	The attribute datatype should not refer to a class specification, it will be ignored otherwise.

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<<XSDany>>

UML Construct	Class; Attribute
Description	If applied to a UML attribute, an XSD anyAttribute element is generated. If applied to a UML class, an XSD any element is generated.
Tagged Values	
namespace:	Refer to the W3C XML Schema recommendation.
processContents: (skip | lax | strict)	Refer to the W3C XML Schema recommendation.
Constraints	None.

<<XSDrestriction>>

UML Construct	Generalization
Description	Overrides the default use of XSD extension for inheritance and generates the child as a complexType with a restriction element instead.
Tagged Values	None.
Constraints	Applies only to UML class parent-child relations.

<<XSDgroup>>

UML Construct	Class
Description	An XSDgroup is generated for classes with this stereotype.
Tagged Values	
modelGroup: (sequence | choice | all)	Overrides the default XSD model for generating this group definition.
Constraints	A group class can only associate itself to other group classes. A group class can be associated by another group class or a complexType class. The association should be via an association link. A group class cannot be inherited/aggregated.

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<<XSDtopLevelElement>>

UML Construct	Class
Description	Creates an <xs:element> construct which acts as a container for XSDcomplexType and XSDsimpleType class.
Tagged Values	None
Constraints	An XSDtopLevelElement class can contain either a XSDsimpleType or a XSDcomplexType as its child class. When such a class is present as its child, all its inheritance will be ignored. This class cannot be inherited.

<<XSDtopLevelAttribute>>

UML Construct	Class
Description	Creates an <xs:attributr> construct which acts as a container for XSDsimpleType class
Tagged Values	
use: (optional | required | prohibited)	Refer to the W3C XML Schema recommendation.
Constraints	An XSDtopLevelAttribute class can contain only a XSDsimpleType class as its child class. When such a class is present as its child, all its inheritance will be ignored. This class can inherit from only one XSDsimpleType class.

<<XSDunion>>

UML Construct	Class
Description	Creates an <xs:union> construct which can act as a container for XSDsimpleType class.
Tagged Values	None
Constraints	An XSDunion class can contain only XSDsimpleType as its child class and can generalize from other XSDsimpleType classes only. All the classes that this class generalizes becomes the members of the attribute "memberTypes". This class cannot have any attributes or associations.

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<<XSDattributeGroup>>

UML Construct	Class
Description	Creates an <xsattributeGroup> construct which can act as a container for a set of elements fo stereoType XSDattribute.
Tagged Values	None
Constraints	An XSDattributeGroup class can contain only elements of stereoType XSDattribute and can be associated to other XSDattributeGroup classes only.Only XSDcomplexType classes can associate itself with this class. This class cannot be inherited.

6.1.1.2 XSD Datatypes Package

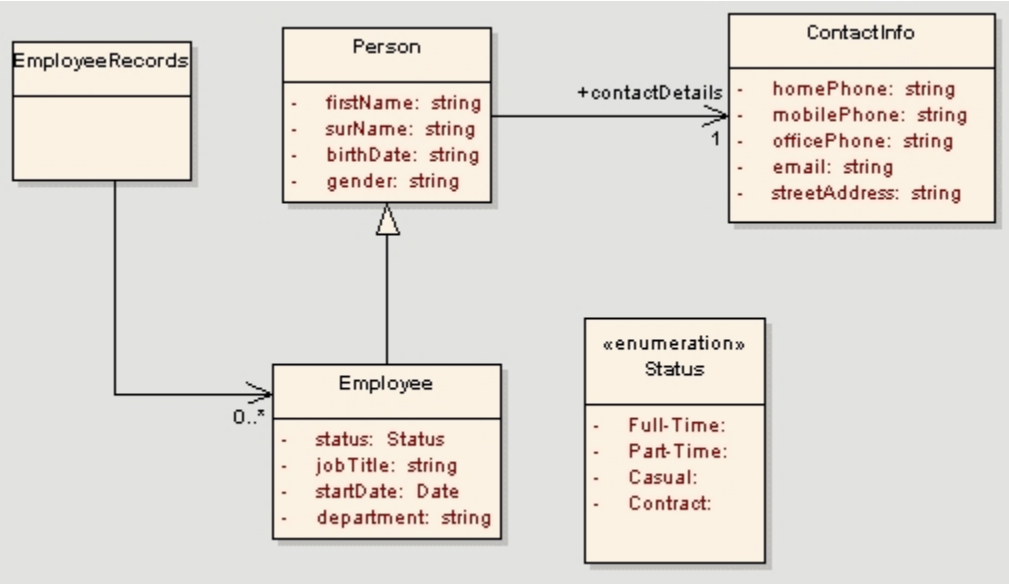
When modeling XSD constructs, it is often useful to have the XSD primitive types represented as UML elements. In this way, user-defined types for example, can reference the datatype elements as part of inheritance or association relationships.

SparxSystems provides the set of primitive XSD data types as a UML package in the form of an XMI file. Each of the XSD primitive types are represented by an UML class in a package named XSDDatatypes.

6.1.1.3 Abstract XSD models

XML schemas may be modeled using simple, abstract class models. This can be useful for allowing an architect to start work a higher level of abstraction, without concern for the implementation details of a schema.

Following is a simplified version of a Employee Details example model, which does not use XSD-specific stereotypes or tagged values.



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The following schema fragment would be generated by EA, given the above model.

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
	<xs:element name="Person" type="Person"/>
	<xs:complexType name="Person">
		<xs:sequence>
			<xs:element name="Person.firstName" type="xs:string"/>
			<xs:element name="Person.surName" type="xs:string"/>
			<xs:element name="Person.birthDate" type="xs:string"/>
			<xs:element name="Person.gender" type="xs:string"/>
			<xs:element name="Person.contactDetails">
				<xs:complexType>
					<xs:sequence>
						<xs:element ref="ContactInfo"/>
					</xs:sequence>
				</xs:complexType>
			</xs:element>
		</xs:sequence>
	</xs:complexType>
	<xs:element name="Employee" type="Employee"/>
	<xs:complexType name="Employee">
		<xs:complexContent>
			<xs:extension base="Person">
				<xs:sequence>
					<xs:element name="Employee.status" type="Status"/>
					<xs:element name="Employee.jobTitle" type="xs:string"/>
					<xs:element name="Employee.startDate" type="xs:date"/>
					<xs:element name="Employee.department" type="xs:string"/>
				</xs:sequence>
			</xs:extension>
		</xs:complexContent>
	</xs:complexType>
	<xs:element name="ContactInfo" type="ContactInfo"/>
	<xs:complexType name="ContactInfo">
		<xs:sequence>
			<xs:element name="ContactInfo.homePhone" type="xs:string"/>
			<xs:element name="ContactInfo.mobilePhone" type="xs:string"/>
			<xs:element name="ContactInfo.officePhone" type="xs:string"/>
			<xs:element name="ContactInfo.email" type="xs:string"/>
			<xs:element name="ContactInfo.streetAddress" type="xs:string"/>
		</xs:sequence>
	</xs:complexType>
	<xs:simpleType name="Status">
		<xs:restriction base="xs:string">
			<xs:enumeration value="Full-Time"/>
			<xs:enumeration value="Part-Time"/>
			<xs:enumeration value="Casual"/>
			<xs:enumeration value="Contract"/>
		</xs:restriction>
	</xs:simpleType>
	<xs:element name="EmployeeRecords" type="EmployeeRecords"/>
	<xs:complexType name="EmployeeRecords">
		<xs:sequence>
			<xs:element name="EmployeeRecords.Employee">
				<xs:complexType>
					<xs:sequence>
						<xs:element ref="Employee" minOccurs="0"
maxOccurs="unbounded"/>
					</xs:sequence>
				</xs:complexType>
			</xs:element>
		</xs:sequence>
	</xs:complexType>
</xs:schema>
```

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6.1.1.3.1 Map UML to XSD

The following table describes the default mapping of UML to XSD constructs. This set of mappings is useful when defining simple schemas from abstract class models. The defaults are also assumed by the the schema generator when generating unstereotyped elements in an abstract model. The XML schema toolbox (and UML Profile for XSD) override these default mappings through the use of stereotypes and tagged values.

UML Construct	Default XSD Production Rules
Package	A schema **element** is generated for the target package. If the target package includes classes from another package, which has the tagged values "targetNamespace" and "targetNamespacePrefix" set, these are included as attributes of the schema element. In addition, an import or include element is created for each referenced package. (An include element is used if the external package shares the same targetNamespace tagged value as the target package. An import element is used where the targetNamespaces differ).
Class	A root-level **element** declaration and **complexType** definition are generated. The element **name** and **type** are the same as the class name. An XSD **sequence** model group is generated to contain UML attributes generated as elements.
Attribute	An **element** is declared for each class attribute. The element **name** is set to that of the UML attribute name. This is prepended with the class name to make the element unique. The **minOccurs** and **maxOccurs** attributes are set to reflect the attribute cardinality. (Note: If left unspecified, minOccurs and maxOccurs default to 1.) If the attribute refers to another class, the element declaration is followed a complexType definition, which contains a reference to the appropriate complexType.
Association	An **element** is declared for each association owned by a class. The element **name** is set to that of the association role. The **minOccurs** and **maxOccurs** reflect the cardinality of the association. Note: if the direction of the association is unspecified, the owner is assumed to be the source.
Generalization (Inheritance)	For single inheritances, an **extension** element is generated with the **base** attribute set to the base class name. The UML attributes of the child class are then appended to an **all** model group within the extension element.
<<enumeration>> (stereotype)	A **simpleType** element is declared for the enumeration class with the **name** attribute set to the class name. A **restriction** element is generated with **base** set to **string**. Each of the class attributes are appended to the restriction element as XSD **enumeration** elements with value set to the UML attribute name. Any type specification for the UML attributes will be ignored by the schema generator.

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6.1.2 Generate XSD

The Generate XML Schema feature Forward Engineers a UML class model to a W3C XML Schema (XSD) file. An XML schema corresponds to a UML package in EA, therefore XML schema generation is a package-level operation. Use the following steps to generate an XML schema from a package:

1. In the Project Browser, right click on the package to be converted to XSD to open the context menu.
2. Select *Generate XML Schema* from the *XML Services* submenu.
3. Set the desired output file using the *Filename* field.
4. Set the desired XML encoding using the *Encoding* field.
5. Press *Generate* to generate the schema.
6. The progress of the schema generator will be shown in the *Progress* edit box.

6.1.3 Import XSD

The XML Schema Import facility is used to Reverse Engineer a W3C XML Schema (XSD) file as a UML class model. XSD files are imported into MDG integration for Visual Studio 2005 as a UML package. Use the following steps to import an XSD file:

1. In the EA Project View, right click on a package to open the context menu. This package will contain the imported XSD package.
2. Select *Import XML Schema* from the *XML Services* submenu.
3. Select the input file using the *Filename* field.
4. The *Target Package* field will be automatically set to the name of the selected input file by default. If required, this name can be changed.
5. Check the *Create Logical Diagram for Package* checkbox if the imported elements are to be displayed on the diagram (selected by default).
6. Press *Import* to Import the schema.
7. The progress of the schema import will be shown in the Progress status bar.

6.2 Web Services (WSDL)

MDG integration for Visual Studio 2005 supports Forward and Reverse Engineering of the W3C Web Service Definition Language (WSDL). The following topics explain how to use EA to model, generate and import WSDL files.

- Model WSDL
- Import WSDL
- Generate WSDL

6.2.1 Model WSDL

WSDL documents are represented as components marked with the stereotype "WSDL". WSDL documents are contained in a package hierarchy representing the target WSDL namespace and its constituent XSD Types, Messages, PortTypes, Bindings and Services. The top-level package is stereotyped as a

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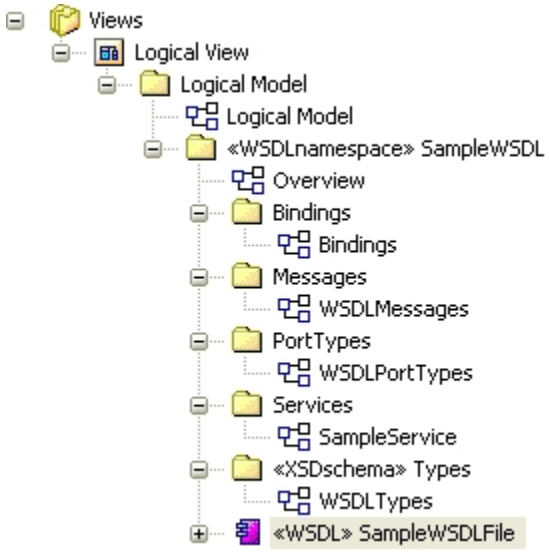
WSDLnamespace. The figure below shows a skeletal WSDL namespace package structure:



A WSDLnamespace package may contain one or more WSDL components. Each WSDL component may be automatically generated to a WSDL file using EA's built in WSDL generator. The following sections describe the various WSDL elements supported by EA.

6.2.2 Generate WSDL

The Generate WSDL feature Forward Engineers a UML model to a Web Service Definition Language (WSDL) file. The Generate WSDL feature acts on a package stereotyped with WSDLnamespace. It is used to Generate any or all of the WSDL stereotyped components owned by the target WSDLnamespace structure. Use the following steps to generate one or more WSDL files from a WSDLnamespace:

1. In the Project Browser, right click on the target WSDLnamespace package to open the context menu.
2. Select *Generate WSDL* from the *Code Engineering* submenu.
3. For each WSDL component, set the desired output file using the *Target File* column.
4. Set the desired XML encoding using the *Encoding* field.
5. Press *Generate* to generate the WSDL file(s).
6. The progress of the WSDL generator will be shown in the *Progress* edit box.

Tip: *The Generate WSDL dialog may also be accessed from the active diagram by selecting Generate WSDL from the Project menu.*

6.2.3 Import WSDL

The WSDL Import facility is used to Reverse Engineer WSDL files as UML class models. Use the following steps to import a WSDL file:

1. In the Project View, right click on a package to open the context menu. This package will contain the imported WSDL package.
2. Select *Import WSDL* from the *Code Engineering* submenu.

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3. Select the input file using the *Filename* field.
4. The *Target Package* field will be automatically set to the name of the selected input file by default. If required, this name can be changed.
5. Press *Import* to Import the schema.
6. The progress of the WSDL import will be shown in the Progress status bar.

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Part VII

7 Working with Code

MDG integration for Visual Studio 2005 allows generation of code directly from model packages and elements, synchronization of model and code, and many more features.

To generate the code for a model element, such as a class in the EA Project Explorer. Right click it and select *Code Services* | *Generate Code.*

To Generate the code for a package in the EA Project Explorer - right click and select *Code Services* | *Generate Code.* This will give you a dialog with the options to either Forward engineer the code (from model to source) or Reverse engineer (source to model)

Right-click on the package to bring up the context menu. Select code generation, and then either Generate Package to generate code for the entire selected package, or Generate Code to simply generate code for an individual package element.

This will bring up the code generation dialog.

Synchronization keeps your models and your code in line, so that you can always be sure that what is represented in code is represented in the model. For instance, if you have made changes to a class definition by hand-coding, your model will be out of date. Synchronization ensures that the class you have altered will be updated in the model to reflect the changes you have made.

7.1 Reverse Engineering

The Enterprise Architect Integration is able to reverse engineer both source code and Visual Studio binary portables into UML Class diagrams.

Details:
Import Directory
Import Binary

7.1.1 Import Directory

Import Directory

Reverse engineering your project code into UML Class models is a simple process.

Firstly, create and link a new package or use a linked package associated with the project you wish to reverse engineer. Right-Click on the package name in the Project View, and from the context menu select *Code Services* | *Import Directory*.

This will open the Import Directory Structure dialog. Firstly, select the directory for the package you wish to import. Then set the source code type (C++, C# etc.) and the expected file extension (.c, .cs etc.). There are a number of further options you may select to control the import process.

- *Recursively process subdirectories* - selecting this will tell EA to search the directory being imported for subdirectories and to process those also.
- *Create Logical Diagram for each package* - Selecting this tells EA to create a logical diagram for each package being imported.
- *Import defined components - Select this to Import only those with defined components*
- *Do not import Private members - By selecting this option, private members are not imported.*

Package Structure

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This selection offers different methods for controlling the packaging of the imported objects.

- *Package Per Directory* - Creates a new package for each directory, including the selected root and all subdirectories if recursion is checked.
- *Package Per Namespace* - This creates a new model package for each namespace encountered in the code being imported.
- *Package Per File* - Creates a new package for each source file that is being imported

Synchronization

This section controls the way EA's import process will deal with pre-existing models.

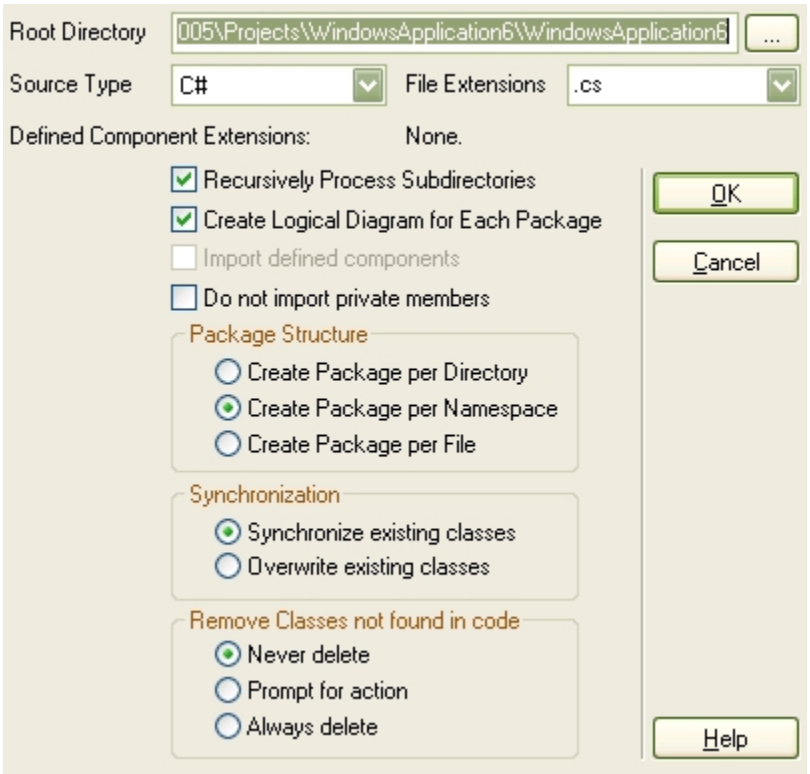
- *Overwrite Existing Models* - If a model with the same name already exists in the package you are importing to, then it will be overwritten by the newly generated model.
- *Synchronize Existing Models* - Models will be synchronized - existing models will be altered to comply with the results of the reverse engineering, but will not be completely overwritten or deleted.

Remove Classes not fond in Code

- *Never delete* - Never delete any classes that are found in the model, but not found in the code.
- *Prompt for action* - If classes are found that are not in the code, ask the user if they are to be removed first.
- *Always delete* - Delete the Classes without user prompting

Once you have set your options, select OK and EA will be invoked to process the directory. When EA is finished, the newly created models will appear in the EA Project View and in the Class view.

Default Settings for C#:



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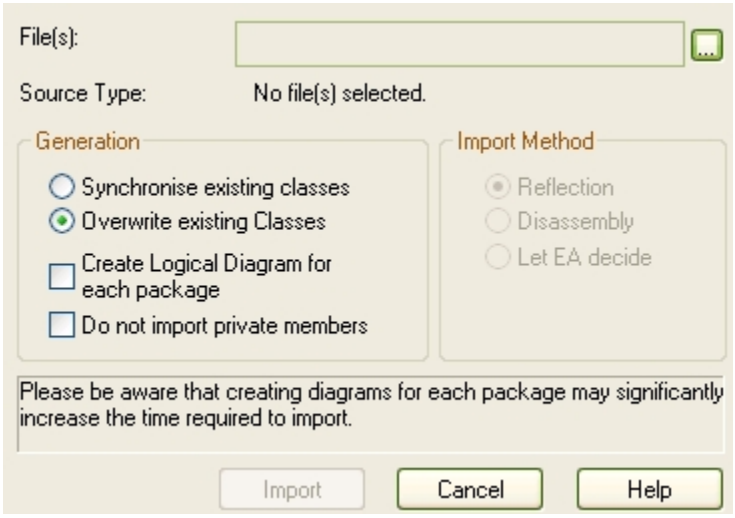
7.1.2 Import Binary

Import Binary

EA is capable of reverse engineering VS .NET portable binaries (*.exe, *.dll) and generating class models.To begin, create a new package in which to store the resulting models. Right-click on the EA project view and select Add | New Package. Right-click on the new package and select Code Services | Import Binary Module.

The Import dialog will open. Firstly select the file that you wish to import. Once you have selected the file there are some other options that must be set.



Generation

Firstly select whether pre-existing classes will be synchronized or overwritten.
Select whether or not to automatically create a Logical Diagram for each package
Do not import private members

Import Method

Allows you to select the method EA will use to analyse the binary file. You may select from Reflection, Disassembly or "Let EA Decide", which will let Enterprise Architect decide which method seems to be most appropriate for the selected file. Once all your settings are set, click the import button and EA will import the binary module, the UML representation is then constructed as a diagram and laid out.

7.2 Model Driven Transformation

UML integration for Visual Studio 2005 supports the Model-Driven Architecture and the use of Platform Independent Models (PIM's) and Platform Specific Models (PSM's).

You are able to create a PIM and define rules for transforming a PIM into a PSM. For instance, a single independent model may generate specific models that account for particular features of a system or language, such as C# or Java.

To perform an MDA transform you first need a master model, the PIM. Once you have created or imported a model, right click on the containing package and select Current Package | Apply MDA Transformation You will be presented with the Model Transformation Dialog.

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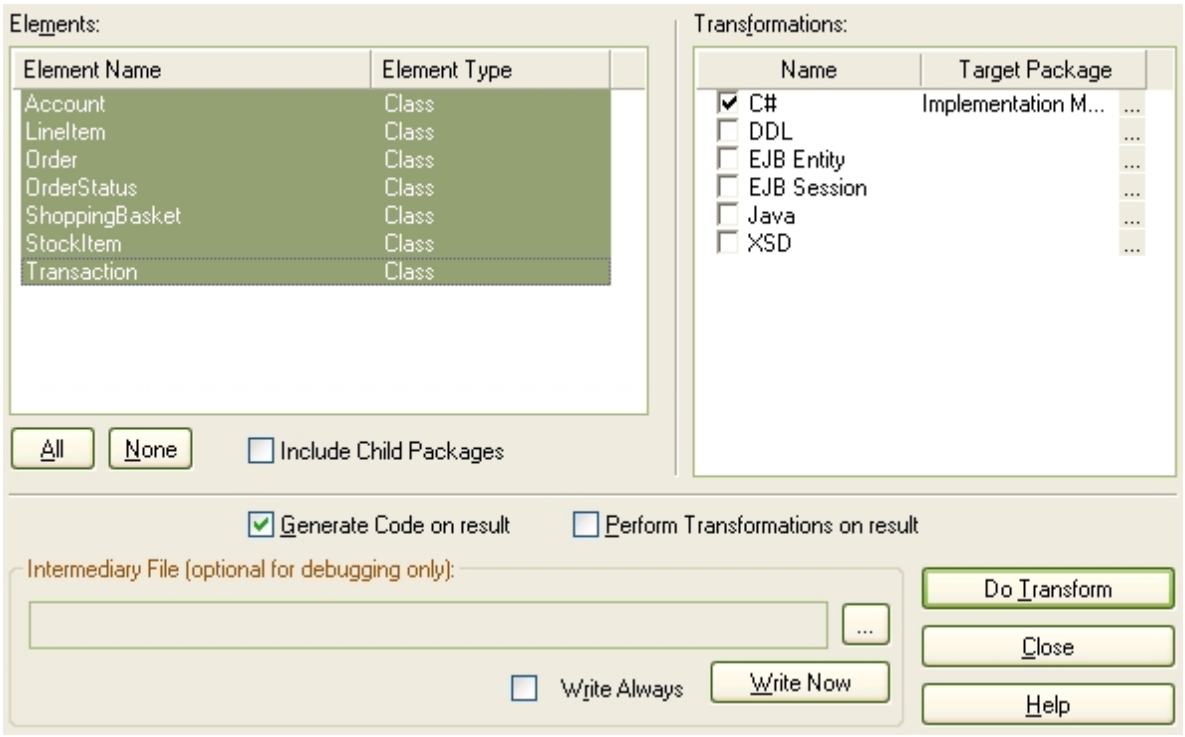

When the dialog is opened, all elements will be selected and all transformations previously performed from any of these classes will be checked.

Control	Description
Elements	Selects the elements that are to be included in the transformation.
All	Selects all of the elements from the list to be included in the transformation.
None	Deselects all of the elements from the list.
Transformations	Allows you to select which transformations to perform and the package each of them should be transformed to.
Select Package [...]	Use the [...] button to select the package in which the transformed elements will be created.
Generate Code on result	Specifies whether or not to automatically generate code from the target classes.
Perform Transformations on result	Specifies if transformations previously done on target classes should be automatically executed. See Chaining Transformations for more information.
Intermediary File Path	Specifies the filename of the intermediary file (if any).
Write Always	Specifies whether an intermediary file should be written to disk.
Write Now	Generates the intermediary file but doesn't perform the transform.
Do Transform	Executes the transform command.
Close	Exits the Model Transformation dialog.
Help	Opens the help file on this page.

For instance, if we are going to transform the basic package into a C# application then under the Transformations window we will selected C#. Once we select the Transformation type, we are prompted to select the destination folder. As shown below we have selected the Implementation Model (PSM) folder:

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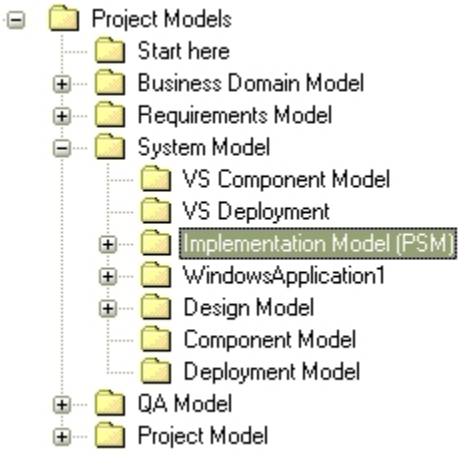

Click the Do Transform button to perform the transformation. These classes will also be generated as code and imported into the Visual Studio 2005 Project.

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Part

8 Generating Documentation

MDG integration for Visual Studio 2005 can automate the generation of documentation based on your project models.

To generate the documentation for a model package, right-click on the package name in the EA Project Explorer and select *Current Package* | *Generate Documentation*.

This will open the RTF Generation dialog. Enter a filename for the document that will be created, and select a style template. Clicking Generate will start EA generating the RTF file.

A dialog will now show the progress of the RTF Generation. Once the document has been created you can view it immediately by selecting view from the dialog.

You may view the document at any time later by opening the file from where it was created.

See Also
RTF Documents
RTF Dialog Options

8.1 RTF Documents

Rich Text Format Documentation
Rich text reports are documents produced by Enterprise Architect in Rich Text Format (RTF), a format common to many word processors. In particular it is targeted at Microsoft Word™, which provides the ability to link together a number of rich text documents into a single master document.

Typically you will create a Word master document, and then some Enterprise Architect RTF reports. These are linked back into sub-sections of the master document and refreshed as required during project development. In this way the project document becomes an easy to manage and feature-rich work product.

By adding tables of contents, figure tables, header & footers and sections you can manage a complex document with relative ease. Simply update the Enterprise Architect RTF reports then refresh the links in MS Word.

Features
Enterprise Architect v 5.0 has introduced a new fully-featured RTF Document generator. Some of the features include:

- Powerful WYSIWYG RTF template editor support allowing:
  - Headers and Footers
  - Images
  - Indexes
  - Tabular Sections
  - Nested Sections
  - All model elements, connectors, diagrams and their properties
  - Template import and export using XML
  - Basic templates supplied for customization
- New document generator:
  - Simplified options
  - Generates complex documents based on new RTF templates
- New embedded RTF viewer
  - View RTF documents generated in EA directly within EA

More Information
For More Information, see:
- RTF Dialog Options

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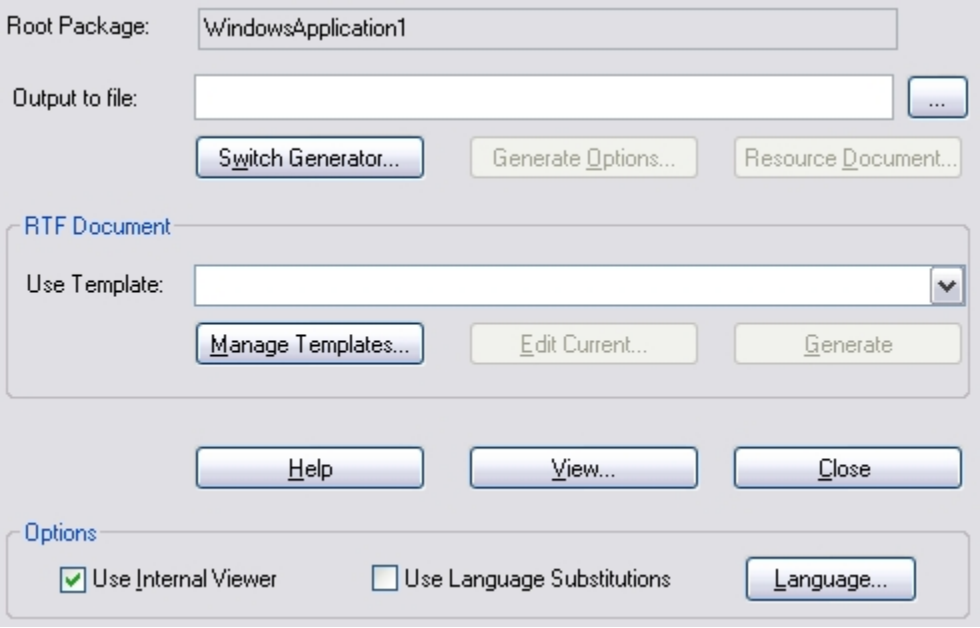
- RTF Document Options
- RTF Templates Dialog

8.1.1 RTF Dialog Options

The RTF Report dialog allows you to set the exact contents and look and feel of your report. The dialog has the following functions:

***Note**: The enhanced RTF Document Generator is not available with the EA Lite versions of EA and the Desktop Edition of EA.*



Control	Function
Root Package	The currently selected package in the Project View.
Output to file	The location and filename of the generated documentation. The Browse [...] button navigates to the location.
Switch Generator	Toggles between the RTF Legacy Generator and the Enhanced Template driven Generator.
Generate Options	Opens the Document Options dialog.
Resource Document	Saves the current options as a document definition.
Use Template	Specifies which RTF template to apply to the document generation.
Manage Templates	Opens the RTF Templates dialog.
Edit Current	Opens the currently named template in the RTF Template Editor.
Generate	Generates the document.
Help	Opens this help page.
View	Launches the generated RTF Documentation in the Windows default RTF file viewer, or in the EA internal viewer if the "Use Internal Viewer" option is selected.
Close	Closes this dialog.

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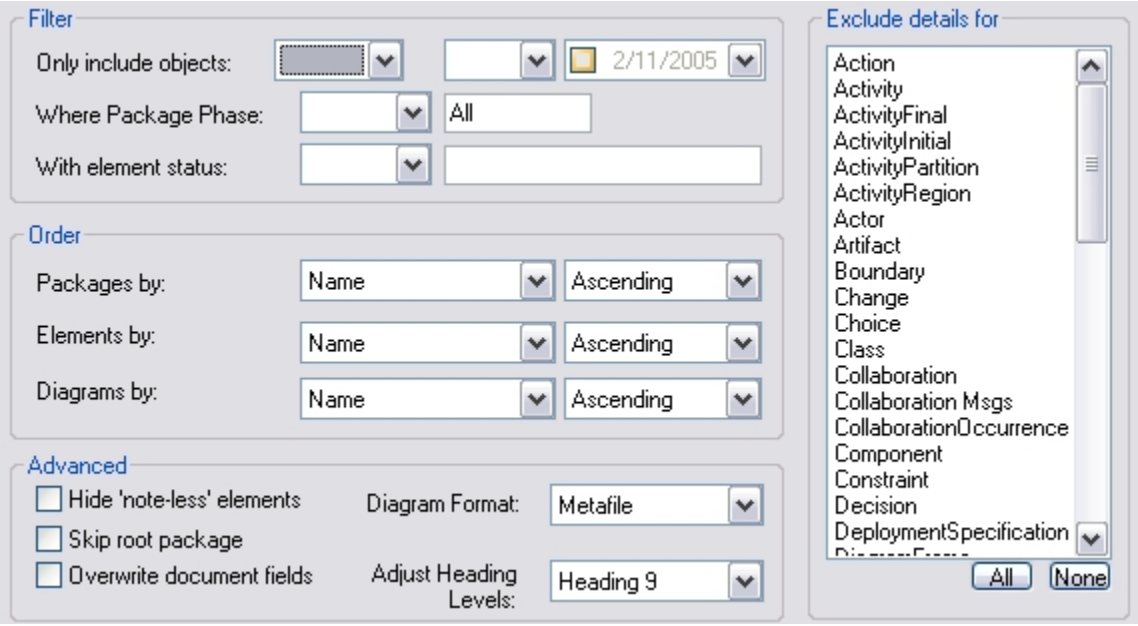
Use Internal Viewer	If set then pressing the View button launches the generated RTF Documentation in the EA internal viewer. Otherwise, launches the generated RTF Documentation in the Windows default RTF file viewer.
Use Language Substitutions	Switches on Custom Language word substitutions
Language	Goes to the Word Substitution dialog. This allows you define translations of technical terms from English into any other language for direct substitution into RTF documents.

8.1.2 RTF Document Options

The RTF Document Options dialog allows you to set the filter and order the elements. This dialog can be opened from two different places, which affects the persistence of options selected:

When you open this dialog by pressing the *Generate Options* button on the Generate RTF Documentation dialog, you can create filtering settings here for the current document set to be run. Selections are non-persistent, and are reset when you select a different template.

The Dialog has the following functions:



Control	Function
Only include objects	Allows elements to be filtered according to date created or modified.
Where Package Phase	Allows elements to be filtered according to the value of the package phase field.
With element status	Allows elements to be filtered according to its status.
Packages by	Orders packages in the generated documentation in either ascending or descending order of Name, Tree Order, Modified Date or Created date.
Elements by	Orders elements in the generated documentation in either ascending or descending order of Name, Tree Order, Modified Date or Created date.

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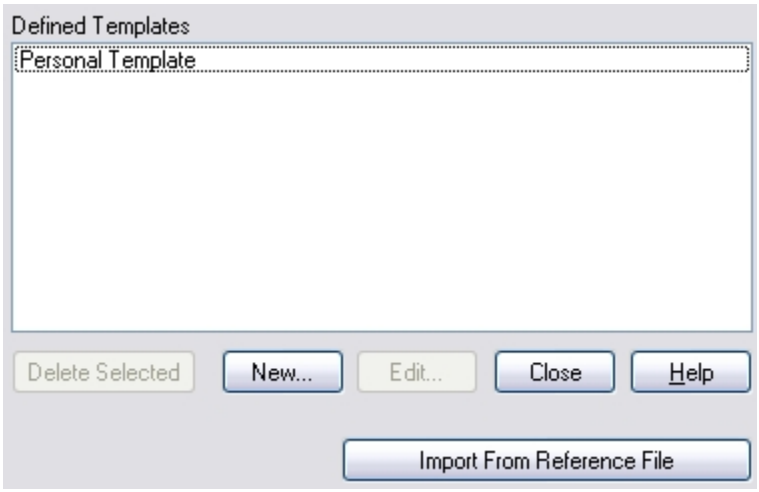
Diagrams by	Orders diagrams in the generated documentation in either ascending or descending order of Name, Tree Order, Modified Date or Created date.
Hide 'note-less' elements	Excludes all elements without notes from the documentation.
Diagram Format	Sets the diagram format for the images included within the documentation to either Metafile or Bitmap.
Skip root package	Excludes the parent package from the documentation and includes only the child packages.
Overwrite document fields	When this option is unchecked, fields defined in a document section are generated with the appropriate values populated in these fields. Turning on this option will replace the fields with actual text.
Adjust Heading Levels	Setting this option will allow the RTF Generator to automatically adjust template headings based on the model depth
Exclude details for	Excludes all elements of the selected type or types to be excluded from the generated document.
OK	Applies the options to the documentation to be generated.
Cancel	Closes the dialog without applying the options.
Help	Opens the help to this page.

8.1.3 RTF Templates Dialog

The *RTF Style Editor* allows you to edit the RTF associated with various sections of the RTF Report facility in Enterprise Architect. You would typically use this functionality to customize a report look and feel for your company or client. The **RTF Templates Dialog** is opened by pressing the *Manage Templates* button on the Generate RTF Documentation dialog. The dialog has the following functions:



Control	Function
Delete Selected	Deletes the selected template.

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New	Creates a new template. These can be based on an existing template or you can start from scratch with a blank template. To make it easier to get up-and-running, EA provides a basic template with default settings that you may like to base your templates on.
Edit	Opens the RTF Template Editor.
Close	Closes this dialog.
Import From Reference File	Allows you to import RTF Templates saved to XML files using the *Tools* | *Export Reference Data* command.

8.1.3.1 RTF Template Editor

The RTF Style Template editor allows for the creation and editing of custom RTF templates to define any outputted RTF documentation. The Style Template Editor lets you select particular model elements and then to specify, from the element type, the fields for inclusion into the generated document.

Formatting styles may be defined in the Style Editor, and items such as tables of contents, headers and more may be added to the document.

For information regarding specific commands used to alter the format of the RTF documentation, see the entries under the RTF Template Editor Commands section.

8.1.3.2 Select Model Elements

To select Model elements for documentation, open the *Sections* tree of the RTF Template Editor. To add an element, check the box next to the element's name. Selecting a model element will add that element as section tags in the Content pane of the Document Template Editor. The position of the section tags within the Sections tree determines the position of the model element in the Content section of the RTF Template editor. For encapsulated elements, selecting a child element will automatically select the parent also.

To move a model element to a different position in the documentation template, select the element and then use the up and down arrows to move that element.

For example, the section tag for Diagram->Element will appear in the content section of the template editor before the section tag for Diagram->Connector.

8.1.3.3 Adding Content

The RTF Template editor uses tags to arrange the content layout of the documentation. To insert a model element tag, use the Selection section of the Template editor. When a selection has been made, model element tags will be inserted into the *Content* section of the Editor. The Yellow highlighted model element names specify the beginning of a tag, which is represented by "sectionname >", and the end of the model element is shown as "< sectionname"

To add model element content, right click in the area between Tag Heading and Tag End. This will display a model element "type"-sensitive list of element fields that can be added to the RTF Documentation. Any additional information entered between the document tags will be included in the generated RTF Documentation.

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8.1.3.4 Tabular Sections

The RTF Template Editor supports rendering a section as a table. This section describes how to render Document Sections in a tabular format. A tabular section is defined as a table containing any number of columns, *but with only TWO rows*. The first row is used to describe the headings of the columns. The Second row defines the output, which is then rendered iteratively for every occurrence of the section in question.

8.1.3.5 Child Sections

Rendering Child Sections

Child sections may be rendered in RTF documentation using one of two different methods. One way is to render model elements directly into the RTF as defined by the section's content and fields. The other is to render indirectly to the RTF by using a parent section to describe the content. The latter option occurs as a result of the creation of a section which has a placeholder section tag (i.e. no content within the tags). This method is used to create recursive documentation of child packages.

Child Document Sections and their corresponding parent sections

Child Section	Section Rendered when used as a placeholder
Package->Child Package	Package
Package->Element->Child Element	Package->Element
Package->Element->Diagram	Package->Diagram
Package->Diagram->Element	Package->Element
Package->Diagram->Connector	Package->Element->Connector

8.1.3.6 RTF Commands

The following topics provide assistance on using the RTF Template Editor.

See:
- Scrolling through text
- File and Printing Options
- Line Editing
- Block Editing
- Clipboard
- Image and Object Imports
- Character Formatting
- Paragraph Formatting
- Tab Support
- Page Breaks and Repagination
- Headers, Footers and Bookmarks
- Table Commands
- Sections and Columns
- Stylesheets and Table of Contents
- Text/Picture Frame and Drawing Objects
- Navigation Commands
- Search/Replace Commands
- Highlighting Commands

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8.1.3.6.1 Scrolling through text

Control	Function
Keyboard:	• Use *Up*, *Down*, *Left* and *Right arrow keys* to scroll up or down a line, or left or right one character. • The *Home* key is used to position at the beginning of the current line. • The *End* key is used to position at the end of the current line. • *Ctrl-PgUp* is used to position at the beginning of a file. • *Ctrl-PgDn* is used to position at the end of a file. • *Page Up* is used to display the previous page. • *Page Down* is used to display the next page. • *Ctrl* + *Left arrow key* is used to position on the next word. • *Ctrl* + *Right arrow key* is used to position on the previous word. • *Ctrl* + *Up arrow key* is used to position at the first column of the current line (if not already on the first column) or at the first column of the previous line. • *Ctrl* + *Down arrow key* is used to position at the first column of the next line. • Press the *F10* key and type in a line number to jump to. This function is also available from the Navigation menu.
Mouse	You can click the mouse on the vertical and horizontal scroll bar to accomplish various scrolling function. These functions are available only if the horizontal or the vertical bar has been enabled by the startup parameters: Vertical Scroll Bar: Click the mouse on the arrows on either end to scroll the screen up or down by one line. Click the mouse above the elevator to scroll the screen up by one page. Similarly, click the mouse below the elevator to scroll the screen down by one page. You may also drag the elevator to any position in the bar. As the elevator is dragged, the editor will scroll the screen up or down accordingly to maintain the correct cursor position. Horizontal Scroll Bar: Click the mouse on the arrows on either end to scroll the screen left or right by one line. Click the mouse on either side of the elevator to scroll the screen left or right by 1/2 screen. You may also drag the elevator to any position in the bar. As the elevator is dragged, the editor will scroll the screen left or right accordingly to maintain the correct cursor position.

8.1.3.6.2 File and Print Options

Control	Function

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New	This command clears an existing template from the edit window and starts an empty, unnamed template. *You will be prompted to save any modification to the previous template.*
Open File	This function is used to clear any existing text from the edit window, and open a new document. *You will be prompted to save any modification to the previous document.*
Save	Use this selection to save the text to the current file name. *If a file is not yet specified, the editor will prompt you for a template name.*
Save As	This selection is similar to Save File. In addition, it allows you to specify a new template name for saving the template. You can invoke this function by pressing *Ctrl* + *Shift* + *S*, or selecting the option from the menu.
Exit	Use this to close an editing session. You can exit by selecting the option from the menu. *If the current template has been modified, you will be prompted to save the modifications.*
Import	This function imports an existing RTF document into the Template Editor, so as to have model elements from that document inserted into the template. *This is useful when creating templates from a predefined document with a particular "look and feel".*
Export	This function saves the template as a RTF document rather than as a template. *This can be useful when the user wishes to save the template for other models.*
Page Layout	Use this option before selecting the Print option to specify the page layout. You can specify margin (left, right, top and bottom) in inches. You can invoke this function by hitting the Ctrl F4 function keys together (or select the option from the menu).
Printer Setup	This option invokes a printer specific dialog box for the default printer (the default printer selection is made from the control panel of Windows) You select the parameters from a set of printer specific options. These options include page size, page orientation, resolution, fonts, etc. You can invoke this function by hitting the *Ctrl* + *Shift* + *P* key or select the option from the menu.
Print	Use this option to print the contents of the current file. You may also choose to print only the selected part of the file. To print a block of text, the desired text must be highlighted before invoking the print function. This command supports these highlighted blocks: Line Block Character Block The print function will print on a default printer selected from the Windows' control panel. You can alter the printer setup or Page Layout prior to invoking the print option. You can invoke the printing function by hitting the *Ctrl* + *P* key or select the option from the menu. The editor will display a dialog box where you can select the scope of the printing.

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Print Preview	This option is used to preview the document before printing. The editor displays up to 2 pages at a time. You can scroll to a different page by using the PgUp/PgDn or the scroll bar. By default the preview rectangle is sized to fit the current window. However, you can use the zoom option to enlarge or shrink the preview rectangle as you wish.
Close	Closes the template editor, closing the editor will prompt the user to save any unsaved information.

8.1.3.6.3 Line Editing

Control	Function
Insert After Current Line	In the text mode this function creates a blank line after the current line. Press the *F9* function key to insert a new line directly after the current line.
Insert Before Current Line	In the text mode this function creates a blank line before the current line. Press *Ctrl* + *F5* together to insert a new line directly before the current line.
Delete Line	Use this function to delete the current line. The remaining lines will be scrolled up by one line. Press *Shift* + *F9* together to delete the current line.
Join Lines	In the text mode this function joins the next line at the end of the current line. Hit the Alt J keys together to invoke this function.
Split Line	In text mode this function splits one line into two. at the current cursor position. Press *Alt* + *S* together to split the line at the current cursor position. Text immediately following the cursor will appear on the next line.

8.1.3.6.4 Block Editing

Control	Function
Copy a Line Block	This command quickly duplicates a selected block of text from one location to another. Highlight the lines of text to be copied, then move the caret to the target location and press *Alt* + *C*, or select the option from the menu. The original text is not deleted. *This command provides a quick alternative to using the clipboard copy/paste functions.*
Move a Line Block	This command moves a highlighted block of text from one location to another Highlight a block of text to be moved, move the caret to the target location and press *Alt* + *M,* or select the option from the menu. The original text is deleted. *This is a quick alternative to using clipboard cut/paste functions.*

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Undo Previous Edit	You can use this command to undo your last edit. Invoke this function by pressing *Shift* + *F8*, or select the option from the menu. A dialog box will appear, containing the information about the command to be undone. The box displays the *line number*, *column position*, *type of undo* (delete/insert/edit) and the contents of the undo buffer. You may modify the target line number or column position. Confirm the operation by clicking on the OK button. *This undo feature is not available for column block edits, block move and replace string commands*
Redo Previous Undo	This command reverses an *undo*. It can only be performed after an undo command.

8.1.3.6.5 Clipboard

Control	**Function**
Cut/Copy Text To Clipboard	Use this command to cut or copy a highlighted block of text to the clipboard. Highlight a block of text to be copied to the clipboard and press *Ctrl* + *X* (cut) or *Ctrl* + *C* (copy), or select the option from the *Edit* menu. *This function also copies the associated formatting information using the RTF format and the native Template Editor format.*
Paste Text From Clipboard	Use this command to paste the contents of the clipboard at the current caret location. Invoke this function by pressing *Ctrl* + *V*, or selecting the option from the *Edit* menu. *Formatting information, if available, is also copied.*

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Paste Special Objects	This function displays the clipboard data in a number of available formats:

Native Object Format

If available, this is the first format in the list box. The data in this format can be later edited using the original application by double clicking the object.

This data can be embedded into your application by using the *Paste* option, or you can create a link to the original file by using the *Paste Link* option.

Formatted Text

This is one of the text formats. This option offers the most suitable format if the data is pasted from another text output application, as the font and formatting attributes are reproduced accurately.

Unformatted Text

This is another text format. This option pastes the text without retaining the formatting information.

Picture Format

The data is available in the Picture format. This object can be later edited (by double clicking the object) using the Microsoft MS Draw application.

Note: *This format is preferred over the Bitmap and the Device Independent Bitmap formats.*

Device Independent and regular bitmap formats

The data is available in the bitmap formats. The object can be later edited (by double clicking the object) using the Microsoft MS Draw application.

The editor converts these formats into the Picture format before calling the drawing application.

8.1.3.6.6 Image / Object Imports

Control	Function
Embed Picture	Use this command to embed a picture bitmap or Windows metafile from an external disk file at the current caret location. The embedded picture is saved within the document.
Link Picture	Use this command to *link* a picture bitmap or Windows metafile to the document. The linked picture appears at the current caret location. Linked picture data *is not* saved with the document, only its filename is stored within the document.
Edit Picture	Use this command to change the width and height of a picture located at the current caret position. The width and height is specified in inches. *This function also allows you to align (top, bottom, or middle) the picture relative to the base line of the text.*

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Insert Object	This function is used to embed objects into the text. The list box shows the applications that are available to create the object. When you select an application, the editor will launch that application. You can create the desired object using this application. When you save the application, the editor inserts an icon for the application. This icon indicates the inserted object. You can later edit the object by double clicking at it. *Note that you can also use the Paste Special function to import the OLE objects, provided that the object is available in the clipboard.*
Drag/Drop Function	This is a method of inserting a file object into the text directly. To insert a file, open the Windows File Manager and locate the file to be inserted. Now click on the icon of the file and keep the mouse button depressed as you drag the mouse cursor to the editor window. Release the mouse button at the location where the object should be inserted. The editor shows an icon to indicate the inserted object. You can edit this object by double clicked at the icon. An object inserted using this method makes use of Microsoft's Packager application to tie the file with the application that originally created it. *Note that a documented problem with the original Packager application may create errors during this function. Install the corrected version of the PACKAGER.EXE program for proper functioning.*
Background Picture	This option, available from the *Other* menu, is used to set a background picture for the text. The background picture occupies the entire text area. The picture file can be a Windows' bitmap (.BMP) or Metafile (.WMF).

8.1.3.6.7 Character Formatting

Control	Function
Character Styles	The following character style commands are available: Command/ Keystroke Normal/Alt 0 Bold Formatting/Alt 1 Underlining/Alt 2 Italic/Alt 3 Superscript/Alt 4 Subscript/Alt 5 Strike/Alt 6 Character style options allows you to apply one or more style formats to the current character, or to all characters in a highlighted block of text. To apply a format to the current character, hit the appropriate keystroke (*Alt* + *1* through *Alt* + *6*), or select the option from the menu. To apply this format on a block of characters, highlight a block using the Line Block or Character Block options. Now, hit the applicable keystroke, or select the option from the menu. When you type on the keyboard, new characters will automatically assume all the formatting characteristics of the preceding character. The template editor allows multiple formats for a character. To apply more that one format, repeat the procedure described in the previous paragraphs. To reset all character formats, highlight the characters and select the 'Normal' option from the menu, or hit the *Alt* + *0* keystroke.

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Fonts	Use this option to change the font typeface and point size of the current character, or a highlighted block of text. If you wish to change the font for a highlighted block of text, select the block using the Line or Character highlight function. If you wish to change the font of a single character, simply position the cursor on that character. Now select the *Font* option from the menu, or press *Alt* + *F10* keys together. A dialog box will appear that shows the list of typefaces and point sizes to select from. Make the desired selection now.
Colors	Use this selection to change the text color of the current character, or a highlighted block of text. If you wish to change the color of a highlighted block of text, select the block using the Line or Character highlight function. If you wish to change the color of a single character, simply position the cursor on that character. Now select the color option from the menu. A dialog box will appear that shows the color selections. Make the desired selection now.
Hidden Text	Text formatted with this attribute is treated as hidden text. Normally the hidden text, as the name implies, does not appear on the screen or printer. However you can display hidden text by selecting the *Show Hidden Text* option from the *View* menu.
Protected Text	The text formatted with this attribute are protected from the editing changes. The protected text appears with a light shade in the window. This function is available only when the *protection lock* is turned off. The *protection lock* can be turned off by using an option from the *Other* menu.

8.1.3.6.8 Paragraph Formatting

Control	Function
Reset Paragraph Format	Resets all paragraph formats for the current paragraph, or for a highlighted block of text. To reset the paragraph formats for the current paragraph, press the *Alt* + *P* keys together, or select the option from the menu. To reset the formats for a block of lines, highlight a block and press *Alt* + *P*, or select the option from the menu.
Paragraph Centering	Centers all lines in the current paragraph or all lines in a highlighted block of text. To center the current paragraph, press *Alt* + *8* keys together, or select the option from the menu. To center a block of lines, highlight a block of text and press *Alt* + *8*,or select the option from the menu.
Paragraph Right Justification	Right justifies all lines in the current paragraph, or all lines in a highlighted block of text. To right justify the current paragraph, press *Alt* + *9* keys together, or select the option from the menu. To right justify a block of lines, highlight a block of text and press *Alt* + *9*, or select the option from the menu.
Paragraph Justification	Block-justifies text on both left and right margins. To justify the current paragraph, select the option from the paragraph menu. To justify a block of lines, highlight a block of text and then select this option from the menu.

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Paragraph Double Spacing	Double space all lines in the current paragraph or all lines in a highlighted block of text. A double spaced paragraph has a blank line of between each text line. To double space the current paragraph, press *Alt* + *O*, or select the option from the menu. To double space a block of lines, highlight a block of text and hit the *Alt* + *O*, or select the option from the menu.
Paragraph Indentation (Left)	Use this selection to create a left indentation for all lines in the current paragraph, or for all lines in a selected block of text. The successive use of this option increases the amount of left indentation. To apply the left indentation to the current paragraph, press the *Alt* + *L*, or select the option from the menu. To apply the left indentation to a block of lines, highlight a block of text and press *Alt* + *L*, or select the option from the menu. To create the left indentation using the mouse, click the left mouse button on the indentation symbol on the lower left end of the ruler. While the mouse button is depressed, drag the mouse to the desired location and release the mouse button. The indentation created using this method is applicable to every line in the paragraph *except* the first line.
Paragraph Indentation (Right)	Use this selection to create a right indentation for all lines in the current paragraph or for all lines in a highlighted block of text. The successive use of this option increases the amount of right indentation. To apply the right indentation to the current paragraph, press *Alt* + *R*, or select the option from the menu. To apply the right indentation to a block of lines, highlight a block of text and press *Alt* + *R* or select the option from the menu. To create the right indentation using the mouse, click the left mouse button on the indentation symbol on the lower right end of the ruler. While the mouse button is depressed, drag the mouse to the desired location and release the mouse button.
Paragraph Hanging Indentation	This option is similar to paragraph left indentation, except that the indentation is *not* applied to the first line of the paragraph. To apply the hanging indentation to the current paragraph, press *Alt* + *T*, or select the option from the menu. To apply the left indentation to a block of lines, highlight a block of text and press *Alt* + *T*, or select the option from the menu. To create the hanging indentation using the mouse, click the left mouse button on the indentation symbol on the upper left end of the ruler. While the mouse button is depressed, drag the mouse to the desired location and release the mouse button.
Paragraph Keep Together	When this attribute is turned on for a paragraph, the editor attempts to keep all lines within the paragraph on the same page.
Paragraph Keep with Next	When this attribute is turned on for a paragraph, the editor attempts to keep the last line of the current paragraph and the first line of the next paragraph on the same page.
Widow/Orphan Control	When this attribute is turned on for a paragraph, the editor attempts to avoid widow/orphan paragraphs. An 'orphan' paragraph results when the last line of the paragraph lies on the next page. A 'widow' paragraph results when the first line of the paragraph lies on the previous page.

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8.1.3.6.9 Tab Support

The RTF Template Editor supports *left*, *right*, *center*, and *decimal* tab stops. The tab stops are very useful for creating columns and tables. A paragraph can have as many as 20 tab positions.

The *left* tab stop begins the text following a tab character at the next tab position. To create a left tab stop, click the left mouse button at the specified location on the ruler. The left tab stop is indicated on the ruler by an arrow with a tail toward the right.

The *right* tab stop aligns the text at the current tab stop such that the text ends at the tab marker. To create a right tab stop, click the right mouse button at the specified location on the ruler. The right tab stop is indicated on the ruler by an arrow with a tail toward the left.

The *center* tab stop centers the text at the current tab position. To create a center tab stop, hold the shift key and click the left mouse button at the specified location on the ruler. The center tab stop is indicated on the ruler by a straight arrow.

The *decimal* tab stop aligns the text at the decimal point. To create a decimal tab stop, hold the shift key and click the right mouse button at the specified location on the ruler. The decimal tab stop is indicated on the ruler by a dot under a straight arrow.

Tab stops can also be created by using the *Set Tab* selection from the *Paragraph* menu. This allows you to specify the tab position, tab type (left, right, center, or decimal) and tab leader (dot, hyphen, underline, or none).

To move a tab position using the mouse, simply click the left mouse button on the tab symbol on the ruler. While the mouse button is depressed, drag the mouse to the desired location and release the mouse button.

To clear a tab position, simply click at the desired tab marker, or select the option from the menu. You can also clear all tab stops for the selected text by selecting *Clear All Tabs* option from the menu.

The *Snap To Grid* option in the *Other* menu affects the movement of the tabs (and the paragraph indentation markers) on the ruler. When this option is checked, the movements of these markers are locked on to an invisible gird at an interval of 1/16 inch.

A tab command is generally applicable to every line of the current paragraph. However, if you highlight a block of text before initiating a tab command, the tab command is then applicable only to the lines in the highlighted block of text.

8.1.3.6.10 Page Breaks

A forced page break can be inserted into the document by pressing the *Ctrl* + *Enter* keys together, or selecting from the *Edit* menu *Break*->*Section Break*. A page break places the text after the page break on the following page. A forced page break is indicated by a solid line in the editing window.
In the *Print View* editing mode, the editor also creates automatic page breaks when the text overflows a page. An automatic page break is indicated by a dotted line in the editing window. As the name implies, these page breaks are calculated automatically by the editor between the keystrokes. The repagination process is time consuming, and sometimes there may not be enough time for a large document to complete the repagination between the edits. Therefore, the menu also provides an option to initiate complete repagination on demand.

Control	Function
Inserting Page Number	The *Page Number* selection from the *Insert* menu allows you to insert the page number into the document. The page number string is inserted at the current cursor position. This string is displayed using a gray color.

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Inserting Page Count	The *Page Count* selection from the *Insert* menu allows you to insert the total number of pages into the document. The page count string is inserted at the current cursor position. This string is displayed using a gray color.
Show Page Border	When option is turned on, the editor displays the borders around the text on the screen. This option is available in *Page* mode only. The *FittedView* option must be turned off.

8.1.3.6.11 Header/Footers

The page header/footer functionality is available in the *Page* Mode only.

Control	Function
Show Page Header/ Footer	Normally, the editor does not show the header and footer for a page. Check this option in the *View* menu to display the page header and footer. This option *does not* allow you to edit the content of the header/footer. Every section in a document can have its own page header and footer. If a section does not have a page header/footer of its own, this option shows the header/footer from the preceding section.
Edit Page Header/ Footer	Enables editing of the text for the page header and footer. This option is available from the *Edit* menu.
Insert Footnote	Inserts a footnote at the current cursor location. The footnote text is displayed at the bottom of the page.
Edit Footnote Text	This option displays the footnote text in-line with the regular text. It allows you to edit the footnote text. The modified footnote is displayed at the bottom of the page.
Insert Bookmark	This dialog box is activated from the *Insert* menu. It allows you to place a bookmark (new or existing) at the current text location. You can also position the cursor at a specified bookmark, and delete existing bookmarks.

8.1.3.6.12 Table Commands

The table menu is available in the *Page* or *Print View* modes only (see Editing Modes). This menu contains commands for the creation of a new table, or to edit an existing table's attributes.

Control	Function
Insert Table	Inserts a new table in the document. This option prompts the user for the initial number of rows and columns in the table. The editor initially creates cells of equal width. The user can, however, change the cell width by dragging the cell borders using the mouse. In *Page Mode*, the table cells are arranged by rows. In *Print View* Mode, the table structure is not visible.
Insert Table Row	Inserts a new row before the current table row. The new table row has the same number of columns as the current row.
Merge Table Cells	Merges together highlighted cells. The width of the resulting cells is equal to the sum of all merged cells. If the highlighted cells span more than one table row, this operation creates multiple merged cells, each within its row.
Split Table Cell	Splits the current table cell into two cells of equal width. The entire text of the original cell is assigned to the first cell. The second cell is created empty.

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Delete Table Cells	Deletes selected cells from a table. A dialog box allows the user to select the cells for the deletion. The dialog box has three options: *cells*, *columns*, and *rows*. *Cells* selects the current cell or all the cells in a highlighted block of text. *Columns* selects all the cells in the current column, or the cells of all columns in the highlighted block of text. *Rows* selects all the cells in the current row, or the cells of all rows in the highlighted block of text. A table is automatically deleted when all its cells are deleted.
Table Row Position	Use this option to position the table or selected table rows. A dialog box lets you position the table as left justified, centered, or right justified.
Table Cell Border	Use this option to create borders around selected cells. A dialog box allows the user to select the cells for this operation. The dialog box has three options: *cells*, *columns*, and *rows*. *Cells* selects the current cell or all the cells in a highlighted block of text. *Columns* selects all the cells in the current column, or the cells of all columns in the highlighted block of text. *Rows* selects all the cells in the current row, or the cells of all rows in the highlighted block of text. The user can specify the width of each border (top, bottom, left and right). The border width should be less than the cell text margin. The cell text margin is the distance from the left edge of the cell to the beginning of the text in the cell. The border width is specified in twips (1440 twips equal to one inch).
Table Cell Shading	Use this option to shade the selected cells. A dialog box allows the user to select the cells for this operation. The dialog box has three options: *cells*, *columns*, and *rows*. *Cells* selects the current cell or all the cells in a highlighted block of text. *Columns* selects all the cells in the current column, or the cells of all columns in the highlighted block of text. *Rows* selects all the cells in the current row, or the cells of all rows in the highlighted block of text. The shading is specified in terms of a shading percentage. A value of 0 indicates a white background, where as the value of 100 indicates a black background.
Show Table Grid Lines	Enables or disables the display of table grid lines. The table grid lines are for display purpose only and will not appear on the printed document.

8.1.3.6.13 Sections and Columns

The editor allows you to divide a document into multiple sections. A multiple section document is useful when:

a) you need to vary the page margins from one page to another
b) you need to create multiple columns of text.

Control	Function

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Creating a New Section	To create a new section, select the *Break* submenu option from the *Edit* menu. A section break line (double solid line) is created before the current line. The new section begins at the text following the break line.
Editing the Section Parameters	The following section parameters can be edited: Number of columns and column spacing. Portrait or Landscape orientation. Placement of the text on the next page. Page Margins The first three parameters can be edited by selecting *Section Edit* from the *Edit* menu. The last parameter can be edited by selecting *Page Setup* from the *File* Menu.
Deleting a section break line	To delete a section break line, simply position the cursor on the section break line and hit the <DEL> key.
Multiple Column Editing	*This option is available in the Print View and Page Modes only (See Editing Modes)* To create multiple columns for a section select *Section Edit* from the *Edit* menu and specify the number of columns to create. You can also specify the space between the columns. Text in a multiple column section wraps at the end of the column. When the text reaches the end of the page, or the end of a section, new text is placed in the next column. In the *Print View* mode, the multiple columns are not actually seen in the window. In the *Page Mode*, columns are visible as they would be when the text is printed. Therefore, the *Page Mode* is useful when editing multiple column text.
Column Break	Normally in a multiple column section, the text flows to the next column at the end of the current column. The column break option can be used to force the text to the next column before the current column is completely filled. A column break can be inserted by selecting the option from the menu (*Edit->Insert Break*...). A column break is indicated by a line with a 'dot and dash' pattern. The text after the column break line is placed on the next column. To delete the column break line, simply position the cursor on the line and hit the <DEL> key.

8.1.3.6.14 Stylesheets & TOC

The editor supports Character and Paragraph-type stylesheet style items. The Character stylesheet style constitutes a set of character formatting attributes and is applied to a character string. The Paragraph stylesheet style constitutes not only a set of character formatting attributes, but also a set of paragraph formatting attributes. The paragraph style is applied to one or more paragraphs.

Control	Function

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Create and edit styles	A stylesheet style is created and modified using the *Edit Style* option from the *Edit* menu. This opens a dialog box which allows you to choose between a character style or a paragraph style. You can select an existing style to modify from the list box or enter a name for a new style. Once you click the 'Ok' button, the recording of the stylesheet properties begins. You can use the ruler, toolbar, or the menu selections to modify the stylesheet items. The ruler, toolbar, and menu also reflect the currently selected properties for the stylesheet item. Please note that the paragraph properties are allowed only for the paragraph type of stylesheet item. After you have selected the desired properties, terminate the stylesheet editing mode by either selecting the *Edit Style* selection from the menu again or by clicking anywhere in the document. If the existing stylesheet item was modified, the document automatically reflects the updated stylesheet properties. If a new stylesheet item was created, your next step is to apply the style to the desired text by choosing the *Style* option from the *Font* or *Paragraph* menu selection.
Apply character styles	The *Style* selection in the *Font* menu allows you to apply a stylesheet style to the currently highlighted character string.
Apply paragraph styles	The *Style* selection in the *Paragraph* menu allows you to apply a stylesheet style to the current paragraph. To apply a style to a range of paragraphs, highlight the paragraphs before selecting the menu option.
Table of Contents	To insert a table of contents, first create the heading styles using the *Edit Style* option from the *Edit* menu. For example, if you wish to insert a three level deep table of contents, create heading styles 'heading 1', 'heading 2', and 'heading 3'. Then place the cursor at the heading lines and apply a suitable heading style using the *Style* menu selection from the *Paragraph* menu. The last step is to position the cursor where you wish to insert the table of contents and select the *Table of Contents* menu selection from the *Insert* menu. The table-of-contents are automatically updated whenever repagination occurs.

8.1.3.6.15 Frame & Drawing Objects

A frame is a rectangular area on the page. A frame can contain both text and picture. The text outside the frame flows around the frame.
A drawing object can be a text box, rectangle or a line. The drawing object overlays on top of the text. To embed a Frame or Drawing object, select the appropriate option from the *Insert* menu. The new object will be inserted at the current text position.

To insert text into the frame or a text box, click a mouse button inside the frame to select the frame. Now type the text at the cursor position.

To size a frame, click a mouse button inside the frame to select the frame. Now click the left mouse button on a sizing tab and move the mouse while the mouse button is depressed. Release the mouse when done. The text inside the frame is automatically wrapped to adjust to the new width. If the new height of the frame is not enough to contain all text lines, the frame height is automatically adjusted to include all lines. If the frame contains only a picture, the picture size is automatically adjusted to fill the frame.

To move the frame, click a mouse button inside the frame to select the frame. Now move the mouse cursor just outside the frame until a plus shaped cursor appears. Click the left mouse button. While the mouse button is depressed, move the frame to the new location and release the mouse button.

To edit the base vertical position of the frame, select the 'Vertical Frame Base...' option from the *edit* | *frame* menu.

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Frames locked to the top of the page or the top of the margin retain their vertical position when text is inserted before them. To edit the border and the background of a drawing object, select the 'Edit Drawing Object' option from the *edit* | *frame* menu. This option is available in the Page Mode only.

8.1.3.6.16 View Options

This menu allows you to turn on and off the following viewing options:

Control	Function
Page Mode	In this mode, the editor displays one page at a time. This mode is available when the editor is called with both the *Word Wrap* and the *Page Mode* (or the *PageView* flag) flags turned on. This mode is most useful for the documents containing multiple columns, as the columns are displayed side by side. In addition, this mode provides all the features of the Print View mode.
Fitted View	A special case of the page mode, in which the text wraps to the window width and the soft page breaks are not displayed..
Ruler	The Ruler shows tab stops and paragraph indentation marks. The ruler can also be used to create or delete tab stops.
Tool Bar	The tool bar provides a convenient method of selecting fonts, point sizes, character styles and paragraph properties. The tool bar also shows the current selection for font, point size and character styles.
Show Status Ribbon	The status ribbon displays the current page number, line number, column number and row number. It also indicates the current insert/overtype mode.
Show Hidden Text	This option displays the text formatted with the hidden attribute (see Character Formatting Options) with a dotted underline. When this option is turned off, the hidden text is not visible.
Show Paragraph Mark	This option displays a symbol (an inverted 'P') at the end of each paragraph. This option may be useful when working with lines with many different heights.
Hyperlink Cursor	This option is used to display the hyperlink cursor when the cursor is positioned on a hypertext phrase. The hyperlink cursor is an image of a hand with a finger pointing to the text.
Zoom	This feature allows you to shrink or enlarge the display of the document text. The editor allows a zoom percentage between 25 and 200.

8.1.3.6.17 Navigation Commands

Control	Function

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Jump	Use this function to reposition to a desired line number. You can invoke this function by pressing the *F10* key, or selecting the option from the menu. The editor will then display a dialog box so that you can enter the line number to jump to. See Scrolling Through the Text for other navigation functions.

8.1.3.6.18 Search and Replace

Control	Function
Search a Text String	Use this function to locate a string of characters in the current file. The editor will search for the first instance of the given character string. To find the subsequent instances of the same character string, use Search Forward or Search Backward commands. You can invoke this function by pressing the *F5* key, or selecting the option from the menu. The editor will display a dialog box where you can enter the character string to locate. You can specify the search to be in a backward or forward direction from the current cursor position, or you can specify the search to take place from the beginning of the file. *You can also force a non-case-sensitive search, in which case the string is matched irrespective of the case of the letters in the string.*
Search Forward	Use this function to locate the next instance of a previously located string using the Search Function. If the Search Function is not yet invoked, this function will call the Search Function instead. You can invoke this function by pressing the *Control* + *F* Keys together (or select the option from the menu).
Search Backward	Use this function to locate the previous instance of a previously located string using the Search Function. If the Search Function is not yet invoked, this function will call the Search Function instead. You can invoke this function by pressing the *Control* + *Shift* + *F* Keys together (or select the option from the menu).
Replace a Text String	Use this function to replace a character string with another character string. You can invoke this function by pressing the *F6* key, or selecting the option from the menu. The editor will show a dialog box where you will enter the old and new character strings. You may also choose to conduct the replace only within a selected part of the file. To choose such a block of text, the desired text must be highlighted before invoking the replace function. *The dialog box also offers you an option to force the editor to verify each replace.*

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8.1.3.6.19 Highlighting

Control	Function
Highlight a Character Block	Use this function to highlight a block of characters. Mouse: Position the mouse cursor on the first character of the block and depress the left button. While the left button is depressed, drag the mouse to the last character of the block and release the mouse. Keystroke: Position the caret on the first character of the block and press the *Shift* key. While the key is pressed, use the position keys to move the caret to the last character of the block and release the *Shift* key. Normally, you can also use any position key in combination with the *Shift* key to create, expand, or shrink the text selection. Normally, a function that utilizes a character block also erases any highlighting. To explicitly erase the highlighting click a mouse button again or press any position key.
Highlight a Line Block	Use this function to highlight a block of lines. Mouse: Position the mouse cursor at any position on the first line of the block and depress the right button. While the right button is depressed, drag the mouse to the last line of the block and release the mouse. Keystroke: Position the caret at any position on the first line of the block and press *F8*. Use the *Up* and *Down arrow keys* to position the caret on the last line and press *F8* again. Normally, a function that utilizes a line block also erases any highlighting. To explicitly erase the highlighting click a mouse button again or press the *F8* key again.
Highlight a Word	Double click any mouse button on the desired word to highlight the word.

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Part

9 Import Database Schema

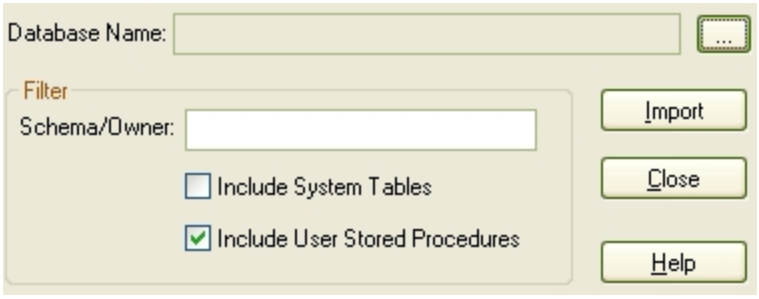
MDG integration for Visual Studio 2005 supports importing database tables from an ODBC data source. Tables will be imported as stereotyped classes with suitable data definitions for the source DBMS.

Import Database Tables and Stored Procedures

To import database tables and stored procedures, follow the steps below:

Note: *Import of stored procedures is supported only for SQL Server and Oracle.*

1. Select any package in the *Logical View*.
2. To import into the package only, right-click on the package to bring up the context menu.
3. Select *Code Services* | *Import DDL schema from ODBC*.
4. To import into a diagram, select a suitable diagram in the selected package.
5. Right click on the diagram to open the context menu.
6. Select *Import DDL schema from ODBC*.
7. Select an ODBC data source, then press *Import* to start the import. When synchronizing existing classes, select the appropriate check box to determine whether the model comments, default values or constraints are to be synchronized with the ODBC tables. Select "Include User Stored Procedures" to also import stored procedures.



Note: *It is only possible to import into a diagram if it is in the selected package. If a diagram from another package is open, a message will give the option to cancel the import or to continue importing into the package only. The Dialog includes options to import into Diagram & Package, or Package Only. If no diagram is open, the Package Only button will be selected and the options will be disabled. If the open diagram is in the selected package, either option can be selected.*

8. Choose an ODBC data source. Select a suitable data source from the ODBC dialog (ODBC must be installed and configured on your machine for this to work correctly).

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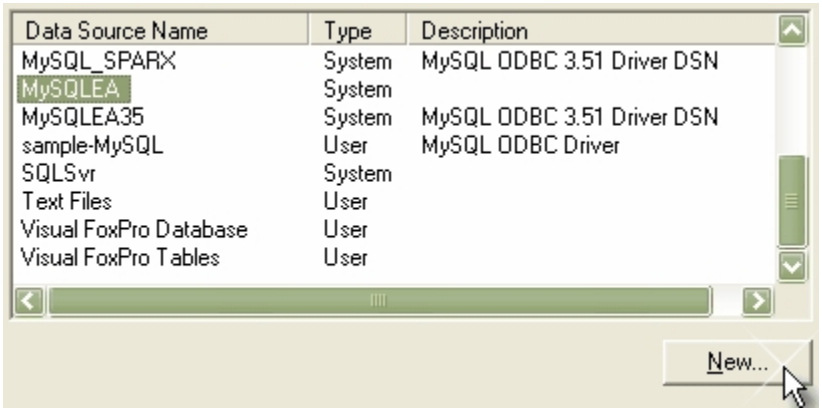
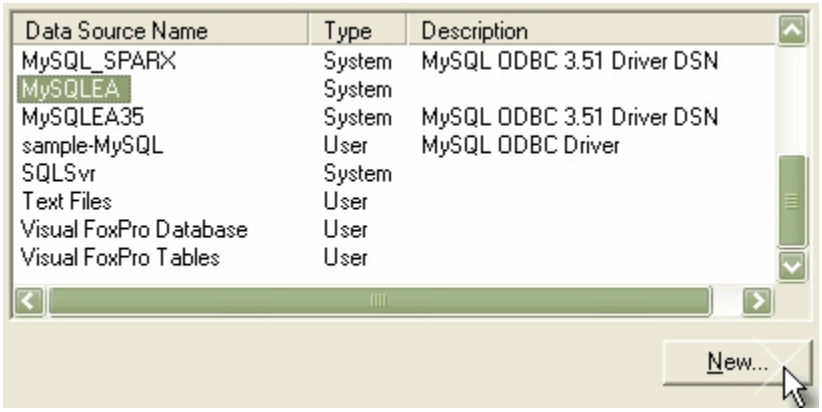


9.1 Select a Data Source

Importing DDL from existing data sources requires you to have installed and configured a suitable ODBC connection. From the Import DDL dialog you can select the ODBC data source using the standard windows ODBC set-up dialog.



9.2 Select Tables

Once you have opened the ODBC data source, EA will acquire a list of tables and stored procedures suitable for importing. This is presented in a list form for you to select from. Highlight the tables and/or stored procedures you wish to import and clear those you do not require.

Selection shortcuts:

- To select all tables, press *Select All*
- To clear all tables, press *Select None*
- Hold down the *Ctrl* key while clicking on tables to multiple select
- Hold down *Shift* and click on table to select a range

The selection dialog:

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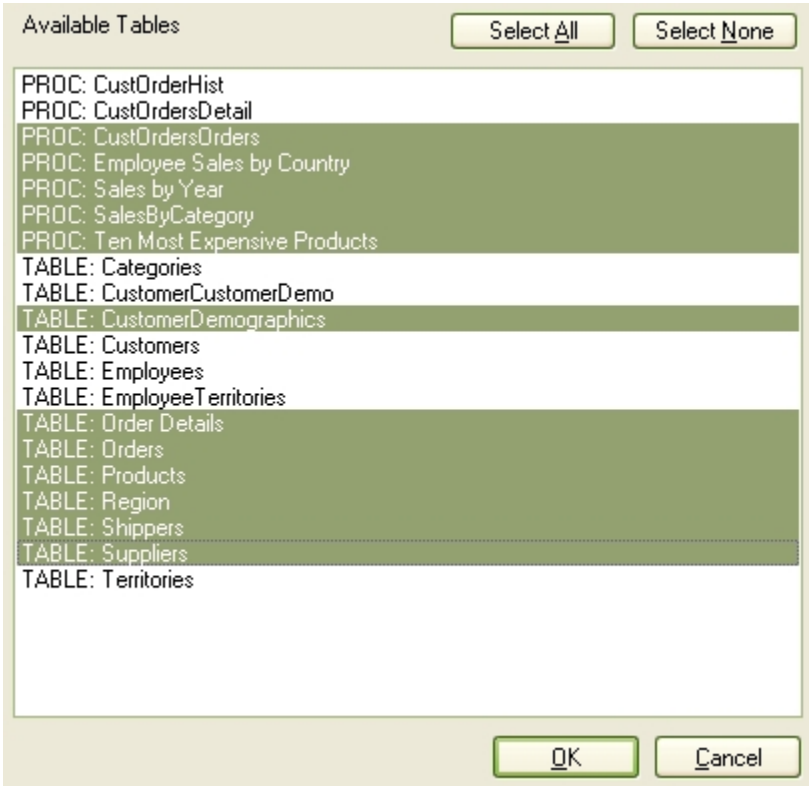

9.3 Imported Class Elements

When you import DDL table definitions they are converted to stereotyped classes according the UML Data Modeling Profile.

If any Stored Procedures are imported, a class stereotyped as a <<stored procedures>> container is created having the same name as the database being imported. The stored procedures are represented as operations in this class.

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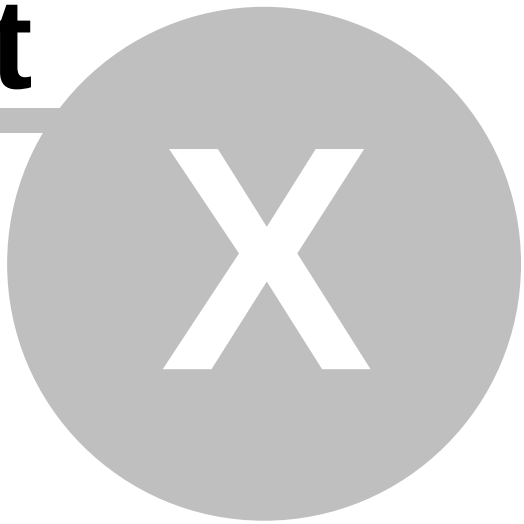
Part



10 Advanced Features

Below you will find links to some of the more advanced features that are available within the MDG integration for Visual Studio 2005.

Links:
Baselines and Differences
Validate Model

10.1 Baselines and Differences

Baselines

MDG integration for Visual Studio 2005 provides a facility to "Baseline" (snapshot) a model branch at a particular point in time. Baselines are in XMI format and are stored within the model in compressed format. More than one baseline can be stored against a single MDG integration for Visual Studio 2005 package. Using Baselines, a snapshot can be taken of a model branch at a particular point in development for later comparison to the current package state.

Compare (Diff)

The Compare (diff) Utility lets you explore what has changed within a model over time and how previous versions of a model branch differ to what is currently in the model. This utility allows you to compare a model branch in EA with a Baseline created using the Baseline functionality, a file on disk, created previously using the EA XMI export facility, or the current version controlled XMI file on disk as created when using Version Control in EA

For more information, see:

- Baselines
- The Compare Utility

10.1.1 Baselines

Baselines

Enterprise Architect (Corporate Edition) provides a facility to "Baseline" (snapshot) a model branch at a particular point in time. Baselines are in XMI format and are stored within the model in compressed format. More than one baseline can be stored against a single EA package.

Using Baselines, a snapshot can be taken of a model branch at a particular point in development for later comparison to the current package state. This is most useful for determining changes made to the model during development compared to some Baseline saved at a crucial point, for example the completion of a phase or version iteration.

Baselines are particularly useful during requirements management to check for changes, additions and deletions which have occurred since the start of the current work phase. Knowing how a model has changed is an important part of managing change and the overall development process.

Baselines are generally used in conjunction with the Compare utility (diff) which is also built into the Corporate and Professional versions of EA.

A typical scenario for using baselines would be to:

1. Create the base model branch to a sufficient point to create a Baseline (checkpoint). Create and store the Baseline as Version 1.

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2. As work continues on development, managers and developers can check the current model branch against the baseline for important modifications, additions and deletions. The Compare (diff) tool can be invoked from the Baseline dialog to check the current model branch against the stored version.

3. As required, minor baselines can be created to check recent progress. these "temporary baselines" are useful for managing change when a lot of work is being done and it is important to only see what has changed in the last 24 hours for example.

4. At sign off or the move to a new version/phase, a major baseline can be created to capture the new state of the model. Minor baselines created earlier may be deleted if required to save space.

Limitations:

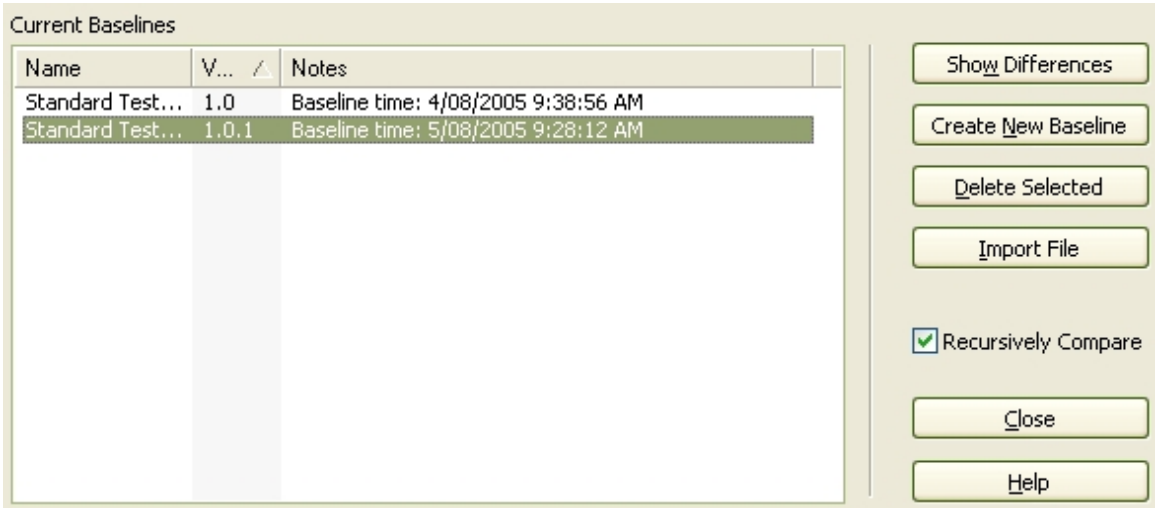
Currently diagrams are not differenced, only the elements and links between them - including all associated information, such as tests, resources, problems etc.
Large packages may take considerable time to fully difference and it may pay to uncheck the "Deep Compare" option on the Baseline dialog. In this case EA will difference the highest level items first and only move into sub items when they are clicked on in the tree (compare "on demand").

See Also

- Managing Baselines
- Creating Baselines

10.1.1.1 Managing Baselines

To open the Manage Baselines dialog, right-click on the package at the head of the appropriate model branch and select the *Package Control* | *Manage Baselines command*.



Item	Functionality
Current Baselines	The list of baselines for the current model branch.
Show Differences	Runs the compare utility on the selected baseline and the current model branch.
Create New Baseline	Creates a new baseline
Delete Selected	Deletes the selected baseline.
Import File	Import an XMI file from the file system as a baseline for this current model branch.
Recursively Compare	If set performs a Deep Compare; otherwise performs a Shallow Compare. See Deep Compare for more details.
Help	Opens the help file on this page.

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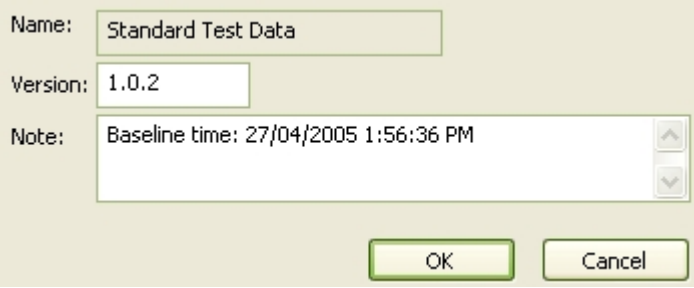
Close	Closes the Manage Baselines dialog.

10.1.1.2 Creating Baselines

The New Baseline dialog is opened by pressing *Create New Baseline* from the *Manage Baselines* dialog (see Managing Baselines).

Pressing *OK* will create a new baseline and return you to the Manage Baselines dialog.



Item	Functionality
Name	Fixed as the Package Name for the currently selected model branch.
Version	You are free to enter whatever you like in this field, but it must be unique for the current branch.
Note	By default shows current time and date, but you are free to enter anything in this field.

10.1.2 The Compare Utility (Diff)

The Compare Utility (Diff)

MDG integration for Visual Studio 2005 has a comprehensive and powerful differencing utility built in. This utility allows you to compare a model branch in MDG integration for Visual Studio 2005 with:

1. A Baseline created using the Baseline functionality
2. A File on disk, created previously using the MDG integration for Visual Studio 2005 XMI export facility (must be in MDG integration for Visual Studio 2005 format and have the same package as the root node)
3. The current version controlled XMI file on disk as created when using Version Control in MDG integration for Visual Studio 2005

Compare (diff) lets you explore what has changed within a model over time and how previous versions of a model branch differ to what is currently in the model. It is even possible to do a full model compare by exporting all of Model A to XMI, then using Compare to File from within the current model (Model B).

Comparing and checking model development at various points in the process is an important aspect of managing change and development, keeping track of what is being modified and ensuring the development and design process is on track.

Access to the Compare Utility is available from:

1. The Baseline Dialog (from the Project Browser context menu, select *Current Package* | *Manage*

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Baselines).

Limitations

The following known limitations apply:

- Diagram compare is currently not supported.
  - Differencing very large package structures can be slow. It is recommend that you set the Deep Compare check box to false.
- Currently no "Print" facility to export Compare results to file.

10.1.3 Deep Compare

On the Baseline dialog, a "Recursively Compare" checkbox is provided. If set this will select a "Deep Compare", if cleared it will select a "Shallow Compare".

A Deep Compare will recurse through all packages and all elements immediately and fully populate the result tree. This is the best way to immediately load and see all changes, but may be very slow on large package structures.

The Shallow Compare is used on large packages, and only loads and compares the high level items first. As you click on nodes and open them up, if the node contains child items, they will be then "compared on demand" and the result shown in the tree. This lets you handle very large packages in a timely fashion and focus on only selected aspects of the model branch.

10.1.4 Example Comparison

Below is what you will find in a comparison

- A hierarchy of model elements is displayed in the left-hand pane. It is clearly visible, from the Status column and from the triangular icon, which elements in the hierarchy have changed since the baseline.
- Shown below, In the right-hand side of the result window, a table of properties is displayed for the element currently selected in the left-hand pane. The values of the properties in the current model and in the baseline are displayed. If any properties have changed between the model and the baseline, the row is highlighted. This example shows that for the class named "AbstractFactory", the date modified, the code generation language and the version number have all changed since the baselined version.

DateCreated	21/10/2005 6:41:11 PM	21/10/2005 6:41:11 PM
DateModified	3/11/2005 10:45:29 AM	3/11/2005 10:44:43 AM
Difficulty	1	1
GenFile	C:Documents and SettingsSamMy DocumentsVisual Studio 2005ProjectsWindowsApplication1WindowsApplication1Form1.cs	C:Documents and Settir 2005ProjectsWindowsA
GenType	C#	C#
IsLeaf	false	false
IsRoot	false	false
Keywords		
Multiplicity		
Name	Back_Page	Front_Page
Notes		
ParentPackage	WindowsApplication1	WindowsApplication1

10.2 Validate Model

Model Validation can be performed from within Enterprise Architect. To activate, simply right click on a package and select *Open in Enterprise Architect.*

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Model Validation is explained further here.

10.2.1 Model Validation

Model Validation is used to validate UML models against known UML rules, as well as any constraints defined within the model using the Object Constraint Language (OCL) . Model Validation can be run against a single UML element a diagram or an entire package. The details of the Model Validation process, against the item being validated, is defined below:

- Validating a UML element will validate the element and its children, features (attributes & operations) and relationships (connectors & links).
- Validating a UML diagram will validate the diagram itself (for correctness) as well as any elements and connectors within it.
- Validating a UML package will validate the package, subpackages and all elements, connectors and diagrams within it.

To use the Model Validation use the following steps:

1. Select the Package, Diagram or Element either from *Project View*, or within an open diagram.

2. Select *Project* | *Model Validation* | *Validate Selected* *from the main menu*. [Ctrl+Alt+V]

3. EA will perform the validation process. Results are displayed in the Output window (the output window can be accessed using the *View* | *Output* menu command.
   A progress window is also displayed with a cancel button, allowing you to cancel the validation process at any time, additionally you can also use the *Project* | *Model Validation* | *Cancel Validation* command.

See Also
- Configuring Model Validation
- Rules Reference

10.2.1.1 Configuring Validation

The Model Validation Configuration dialog is used to enable and disable the rules that are run with the model validator. Additional rules may be defined in this dialog from any additional addins that may be installed alongside EA. Additionally, specific Model Validation settings can assigned to a Perspective, for more information regarding Perspectives and their use please refer to the Configure Perspectives topic.

The Model Validation Configuration dialog can be accessed via the main menu by selecting *Project* | *Model Validation* | *Configure*.

See Also
- Model Validation
- Rules Reference

10.2.1.2 Rules Reference

The Model Validation feature works against a set of validation rules arranged in the following groups:

- (Element, Relationship, Feature, Diagram): Well-Formedness
  Responsible for checking whether or not an Element, Relationship, Feature or Diagram is well-formed. This group of rules includes checks such as whether item is a valid UML item and whether a diagram contains valid elements within it

- Element: Composition
  Responsible for checking whether or not a UML Element contains valid children, whether it contains the right number of valid children, and whether or not the element is missing any required children.

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- (Element, Relationship, Feature): Property Validity
  Responsible for checking whether or not the item in question has the correct UML properties defined for it and whether they contain incorrect or conflicting values. For more information about these properties refer to the Custom Properties section.

- (Element, Relationship, Feature): OCL Conformance
  Responsible for validating an item against any defined constraints in OCL.

10.2.1.2.1 Well-Formedness

This group of rules is responsible for checking whether or not an Element, Relationship, Feature or Diagram is well-formed. This group of rules includes checks such as whether item is a valid UML item and whether a diagram contains valid elements within it. Reported violations include:

Violation ID	Description	Information
MVR010001	<<Element>> is not a valid UML Element.	The element is not a recognized UML 2.0 element
MVR050001	<<Relationship>> is not a valid UML Relationship	The relationship is not a recognized UML 2.0 relationship
MVR050002	<<Relationship>> is not legal for <<Start Element>> --> <<End Element>>	The relationship between the given start and end elements is not valid for those elements.
MVR050003	<<Parent Element>>:isLeaf=true and cannot be generalized by <<Child Element>>	The generalization relationship cannot exist between parent and child elements because the parent element is defined as a Leaf element.
MVR050004	<<Child Element>>:isRoot=true and cannot generalize <<Parent Element>>	The generalization relationship cannot exist between parent and child elements because the child element is defined as a Root element.
MVR050005	<<Element>> cannot generalize self	The element cannot be self-generalized
MVR0B0001	Statechart violation: <<extended information>>	The state diagram contains a UML violation, refer to the extended information for more information about the detected violation

See Also
- Model Validation
- Configuring Model Validation
- Rules Reference

10.2.1.2.2 Element Composition

This group of rules is responsible for checking whether or not a UML Element contains valid children, whether it contains the right number of valid children, and whether or not the element is missing any required children.

Error ID	Description	Information
MVR020001	<<Element>> is missing required child element <<Child Element>>	The element is missing a child element of type "Child Element"
MVR020002	Invalid UML package child.	The element cannot be a direct package child and must be a child of another element (for example: Ports must be children of other elements, and not direct UML package members)

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MVR020 003	Invalid child <<Child Element name>> (<<Child Element Type>>).	The child element is invalid on the tested parent element

See Also
- Model Validation
- Configuring Model Validation
- Rules Reference

10.2.1.2.3 Property Validity

This group is responsible for checking whether or not the item in question has the correct UML properties defined for it and whether they contain incorrect or conflicting values. For more information about these properties refer to the Custom Properties section.

Error ID	Description	Information
MVR030 001	<<*Element*>>:<<*Property*>> property is undefined	The element property contains no value
MVR030 002	<<*Element*>>:<<*Property*>> property has invalid value: "<<*Value*>>"	The element property contains an invalid value
MVR030 003	<<*Element*>>:isLeaf=true and cannot be abstract	The element's isLeaft and isAbstract properties are both set to true, which is invalid
MVR060 001	<<*Relationship*>>:<<*Property*>> property is undefined	The relationship property contains no value
MVR060 002	<<*Relationship*>>:<<*Property*>> property has invalid value: " <<*Value*>>"	The relationship property contains an invalid value

See Also
- Model Validation
- Configuring Model Validation
- Rules Reference

10.2.1.2.4 OCL Conformance

This group is responsible for validating an item against any defined constraints in OCL. The Object Constraint Language is used to describe expressions on UML Models. OCL is used to express side-effect free constraints. OCL constraints may be added to any element, relationship or attribute in EA.

Error ID	Description	Information
MVR040 001	OCL violation: <<*violated OCL*>>	The element violates the OCL constraint specified.
MVR070 001	OCL violation: <<*violated OCL*>>	The relationship violates the OCL constraint specified.
MVR0A0 001	OCL violation: <<*violated OCL*>>	The attribute violates the OCL constraint specified.

Defining OCL Constraints for an Element

OCL constraints may be added to an element via the *Properties* dialog. Click on the *Constraints* tab and select *OCL* from the *Type* drop down list. It is important to note that in order to have a valid OCL constraint requires that the syntax be correctly formed, if the expression is not correct EA will inform the user that the OCL constraint is not valid. To perform an OCL Validation, ensure that Constraint (OCL) Rules is selected in the Model Validation Configuration Dialog, OCL violations are recorded in the Model Validation output window.

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Defining OCL Constraints for a Relationship

OCL constraints may be added to a relationship via the *Properties* dialog. Click on the *Constraints* tab and select *OCL* from the *Type* drop down list. It is important to note that in order to have a valid OCL constraint requires that the syntax be correctly formed, if the expression is not correct EA will inform the user that the OCL constraint is not valid. To perform an OCL Validation, ensure that Constraint (OCL) Rules is selected in the Model Validation Configuration Dialog, OCL violations are recorded in the Model Validation output window.

Defining OCL Constraints for a Feature (Attribute)

OCL constraints may be added to a feature via the *Properties* dialog. Click on the *Constraints* tab and select *OCL* from the *Type* drop down list. It is important to note that in order to have a valid OCL constraint requires that the syntax be correctly formed, if the expression is not correct EA will inform the user that the OCL constraint is not valid. To perform an OCL Validation, ensure that Constraint (OCL) Rules is selected in the Model Validation Configuration Dialog, OCL violations are recorded in the Model Validation output window.

See Also

- Model Validation
- Configuring Model Validation
- Rules Reference

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